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THE VETERINARIAN,

A MONTHLY JOURNAL OF VETERINARY SCIENCE.

SEPTEMBER, 1896.

EDITED BY PROFESSOR METTAM.

CONTENTS.

Original Papers. Page

Braxy; its Causation and Prevention. By C. O. Jensen (*Illustrated*) . 621

An Investigation into the Nature, Cause, and means of Preventing the Cornstalk Disease of Cattle. By Veranus A. Moore 639

The Roentgen Rays in Veterinary Practice. By Professor Hobday, M.R.C.V.S., Royal Veterinary College, London, and V. E. Johnson, M.A. (*Illustrated*) 651

Clinical Cases.

Clinical Notes. By E. Wallis Hoare, F.R.C.V.S. 656

Hip-joint Disease showing on Autopsy Trochanteric Osteitis, Gluteal Myositis with Fibroid Degeneration, and Tendinitis with Bursitis Glutei Medii, the actual cause probably being Traumatism. By William M. Scott, M.R.C.V.S., Bridgwater (*Illustrated*) 662

Removal of a Worm from a Mare's Eye. By Reg. Wall, Docking, King's Lynn, Norfolk 666

Three Cases from a Practitioner's Note-book. By Jno. A. W. Dollar: Subcapsular Hæmorrhage in the Liver of the Horse; Partial Recovery; Relapse and Death . 668

Rupture of the Right Ventricle in a Horse 670

Page

Extensive lacerated Wound in the region of the Neck; Rupture of the Trachea; Recovery (*Illustrated*) 672

Editorial Observations.

The Dearth of Clinical Articles . 674

Motor Cars 675

Our Future 676

The Growth of the Register . . 678

The National Veterinary Medical Association 679

The Month's Progress . . 681

Science Notes 686

Current Topics.

Royal College of Veterinary Surgeons —The Examinations in London . 691

A Danger of Clover 692

Sir F. Fitzwygram's Veterinary Prizes, 1896 692

Army Veterinary Department 693

Contagious Diseases in Animals in Great Britain . 694

New Apparatus, &c.

A New Aseptic Neurectomy Case (*Illustrated*) 695

NOTICES TO CORRESPONDENTS . . 696

Reports of Veterinary Medical Societies (pages 12).

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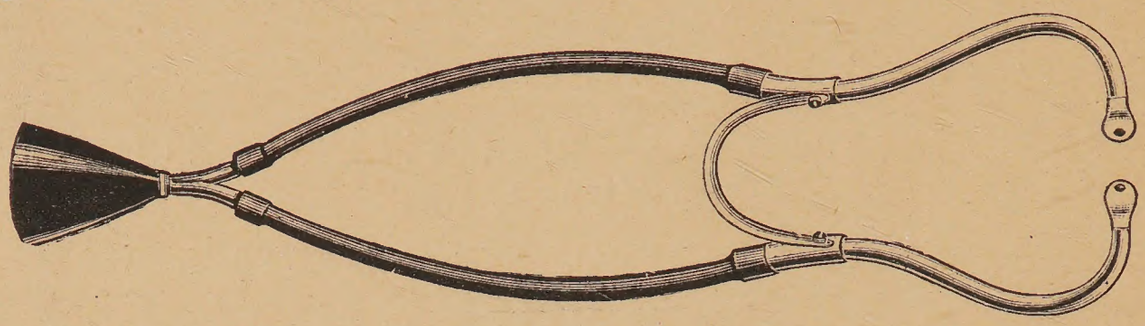

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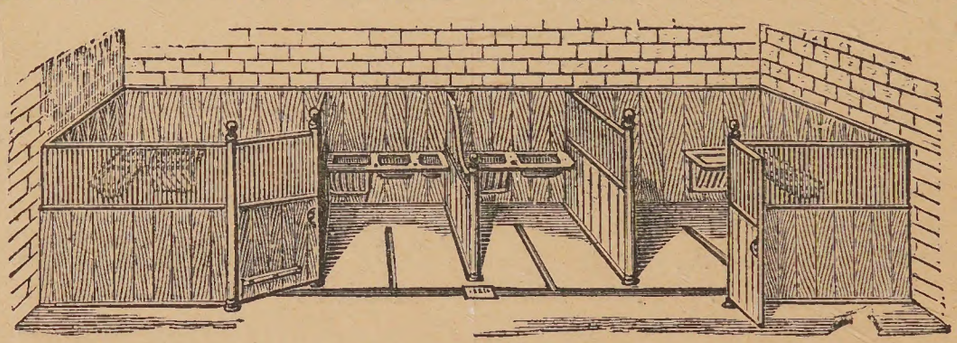

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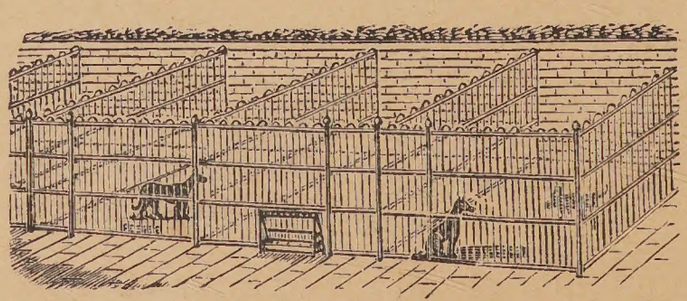

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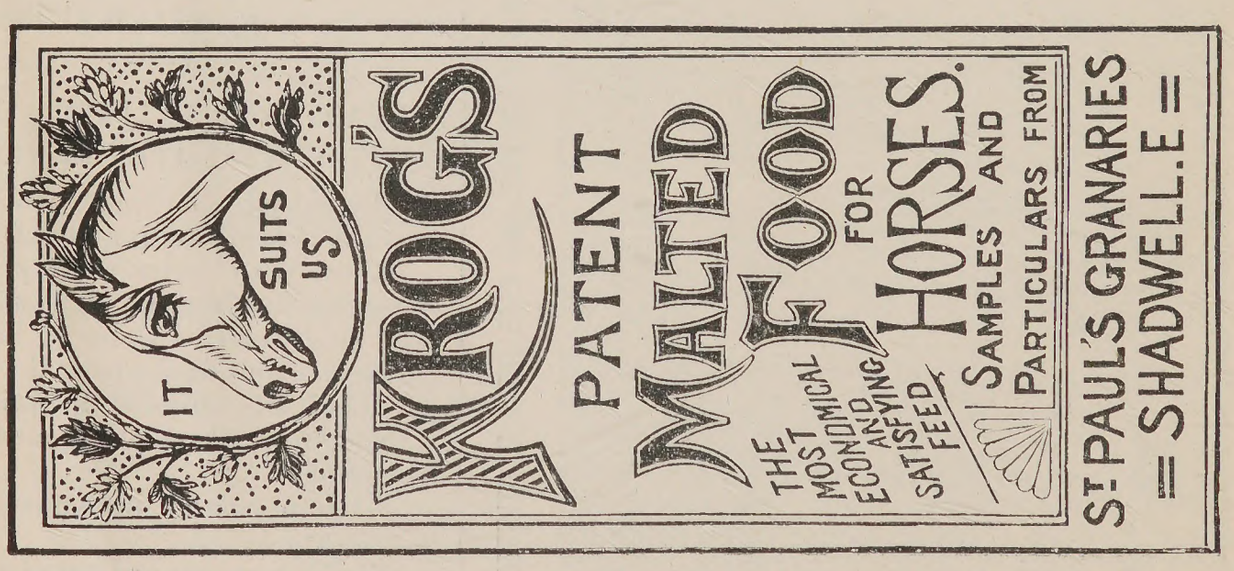

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CONTENTS OF No. 825, September, 1896.

Original Papers: PAGE

Braxy: its Causation and Prevention. By C. O. JENSEN (*Illustrated*) 621

An Investigation into the Nature, Cause, and means of Preventing the Cornstalk Disease of Cattle. By VERANUS A. MOORE . 639

The Roentgen Rays in Veterinary Practice. By Professor HOBDAY, M.R.C.V.S., Royal Veterinary College, London, and V. E. JOHNSON, M.A. (*Illustrated*) 651

Clinical Cases:

Clinical Notes. By E. WALLIS HOARE, F.R.C.V.S.

Rheumatism 656

Rupture and Disintegration of both Kidneys in a Foal . . 658

A Peculiar Case 659

Secondary Hæmorrhage after Castration . . . 660

Hip-joint Disease, showing on Autopsy Trochanteric Osteitis, Gluteal Myositis with Fibroid Degeneration, and Tendinitis with Bursitis Glutei Medii, the actual cause probably being Traumatism. By W. M. SCOTT, M.R.C.V.S., Bridgwater (*Illustrated*) . . 662

Removal of a Worm from a Mare's Eye. By REG. WALL, Doeking, King's Lynn, Norfolk 666

Three Cases from a Practitioner's Note-book. By JNO. A. W. DOLLAR

Subcapsular Hæmorrhage in the Liver of the Horse; Partial Recovery; Relapse and Death 668

Rupture of the Right Ventricle in a Horse . . . 670

Extensive Lacerated Wound in the Region of the Neck; Rupture of the Trachea; Recovery (*Illustrated*) . . . 672

Editorial Observations:

The Dearth of Clinical Articles 674

Motor Cars 675

Our Future 676

The Growth of the Register 678

The National Veterinary Medical Association . . . 679

The Month's Progress 681

Science Notes 686

Current Topics:

Royal College of Veterinary Surgeons—The Examinations in London 691

A Danger of Clover 692

Sir F. Fitzwygram's Veterinary Prizes, 1896 . . . 692

Army Veterinary Department . . . 693

Contagious Diseases in Animals in Great Britain . 694

New Apparatus, &c.:

A New Aseptic Neurectomy Case (*Illustrated*) . . . 695

NOTICES TO CORRESPONDENTS 696

Reports of Veterinary Medical Societies (pages 12).

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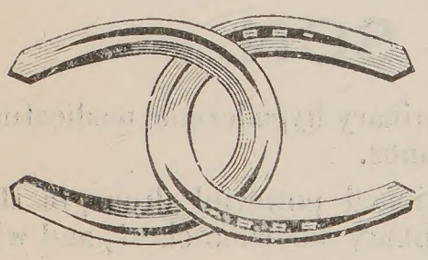

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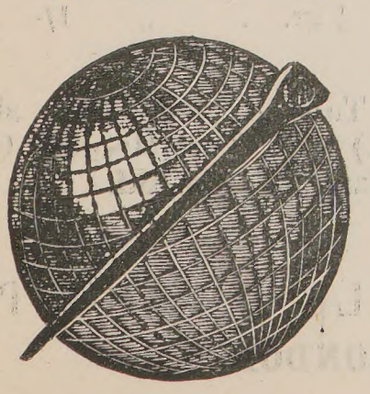

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Original Papers.

BRAXY; ITS CAUSATION AND PREVENTION.*

By C. O. Jensen.

The name Braxy is applied to a disease in some respects resembling anthrax, which appears as an epizootic, and is best known in Iceland, the Faroe Islands, and parts of Norway, though it also occurs in Scotland and Cornwall. In 1872 Krabbe collected all the more important observations on the subject to be found in Danish and Icelandic literature, and a couple of years later gave a *résumé* in the 'Deutsche Zeitschrift f. Thiermedicin.' He describes the disease as infectious, very acute in its course, and as proving fatal within a few hours of the appearance of certain characteristic swellings about the posterior parts of the body. *Post-mortem* reveals extensive dark purplish staining of the abomasum and distension of the digestive canal with gas, while decomposition of the cadaver occurs with excessive rapidity, the liver and kidneys undergoing softening, the skin assuming a bluish tint, the wool becoming loose, and the entire carcass giving off a most offensive stench. Krabbe states that the disease was regarded as a form of anthrax—a view, however, in which he does not coincide. Somewhat later Messrs. J. Sigurosson, S. Jónsson, and Einarsson, all natives of Iceland, and the Norwegian State Veterinary Surgeon, Ivar Nielsen, carefully described

* 'Deutsche Zeitschrift für Thiermedicin,' July, 1886, translated and summarised by John A. W. Dollar.

the disease, throwing considerable light both on the conditions in which it appears and on its ætiology.

According to them, braxy is an acute, or even exceedingly acute, infectious disorder, which begins as a hæmorrhagic inflammation of the mucous membrane of the abomasum, is accompanied by excessive development of gas in the digestive canal, especially in the stomachs, and proves fatal in some cases by a kind of general infection, in others by a specific intoxication, or by dyspnœa due to tympanites.

The oldest accounts are referable to Iceland, where, in 1761, Baron F. V. Hastfer described a disease which was undoubtedly braxy, and was produced, as he believed, by some poisonous food material. In 1772 E. Olafsen and B. Povelson, in a book of travel, describe the disease under the name "Braada-Sott," and direct special attention to the swelling of the posterior parts of the body. The first thorough report is due to M. Ketilson (1778), who details the *post-mortem* appearances, the bluish stains in the abomasum (which, in the event of the animal living long enough, spread until the abomasum "becomes like jelly"), the rapid decomposition, and the changes which occur in the carcass; he also gives excellent descriptions of the method of spread, and the early symptoms of the disease.

A great number of reports were afterwards published: in 1816, one by the Rev. Herr Poulsen; in 1856, another by Dr. Hjaltelin; and, as already stated, a number during the seventies by Sigurosson, Jónsson, and Eniarsson.

The first account of braxy occurring in the Faroe Islands is furnished by Svaboe in a work of travel. In 1800 a description of the islands was given by the Rev. Herr Landt, who treats the disease in some detail, and includes a note on the *post-mortem* appearances. He says the disease had been known since early times, having been introduced by foreign sheep in the fourteenth century. Too much stress must not, however, be laid on this story, which in the light of fuller knowledge seems open to question, though it is of interest as indicating from how early times the disease had been recognised. In 1847 the Rev. Herr Schröter gave a short but very good account of a disease, which was undoubtedly the same as that occurring in Iceland, and went on to say that in former times it was much rarer in the southern islands, but had now greatly increased,—a result he regarded as due to the introduction of foreign sheep from the more northerly islands. In the beginning of 1870 Krabbe found the disease was enzootic, outbreaks continu-

ally occurring, and that it was one of the most important farmers had to deal with.

We have no later information of the disease in the Faroes, probably because no veterinary surgeon lives there ; but there is little doubt it still occurs, as the conditions are little changed ; and, in fact, Dr. Ringberg reports in this sense, though at the time of writing the outbreaks were not numerous.

In Norway the disease has only been recognised for a few years, but there can be no doubt it is as old there as in the localities already mentioned. It was first described in 1876 by a well-known estate owner, Johann Schumann,

The shaded areas indicate the distribution of braxy.

under the title "A Disease of Lambs," while at the same time he referred to a disease in sheep as "anthrax or braxy." In 1888 Ivar Nielsen published some researches on the ætiology of braxy, thus drawing attention to its occurrence in Norway. Since that time the disease has annually been referred to in the official veterinary reports of Norway. From these it would appear that it occurs in

the coast regions between Stavanger and Tromsö Amt, *i. e.* over a very considerable part of Norway, and that it is of great economic importance.

Braxy commits its chief ravages during the winter months; appearing first in autumn, the cases increase as winter approaches, to diminish again in spring: in summer they are exceedingly rare. Pastor Landt noted the peculiarity as long ago as the eighteenth century, and all subsequent reports from Iceland, the Faroe Islands, and Norway confirm his observations. This fact explains why the disease was so long regarded as due to climatic influences. Even at the present day, when it is known to be due to a specific organism, the action of temperature, &c., must still be regarded as probably playing an important part in infection. The disease is said not to occur in mild weather; but whether or not this be true, every one is agreed that it is principally seen during frost, especially when frost is unaccompanied by snow. This fact cannot at present be quite explained, but we shall return to it in speaking of the mode of infection.

From experience gained both in Iceland and Norway, the disease appears to be often localised in certain districts and fields—a fact largely accounted for when we learn that up to the present little or no attempt has been made to prevent the spread of infection from the dead bodies.

Braxy chiefly attacks young animals, and is rare in those over three years of age. The figures given by Hjaltelin, representing the average for a period of five years, are very instructive. He estimates the number of deaths in a single district during the years 1849—1854 at approximately 6000, made up as follows:

Yearling lambs	2440
Two-year sheep	2460
Three-year sheep	1020
Animals older than three years . .	80

The same has been observed in the Faroe Islands. Landt points out that the younger animals suffer most, and in Norway Nielsen also directs attention to the heavy fatalities amongst one-year lambs.

It is easy to understand that, in the earlier descriptions and reports, many cases may have been included which, strictly speaking, were not braxy at all; but excluding such, all observers seem agreed in regarding the disease as exceptionally acute in its course, and as almost invariably fatal. The older writings, in fact, declare that the animals often show no sign whatever of disease until

they suddenly fall and die; but more recent and critical observations tend to controvert this. The sheep suddenly appears ill, is dull, lies about, and cannot be induced to rise; all movement seems to give pain, and from time to time the animal groans; the posterior parts of the body become swollen, and a little froth often escapes from the mouth. This condition may last some hours, and always ends with the animal's death; sheep, which overnight had shown no signs of illness, are often found dead in the morning.

The striking *post-mortem* appearances, especially the hæmorrhagic inflammation of the abomasum, were early the subject of remark, being first described by Ketilson in 1778, and repeated by many of the later writers. There is no doubt this appearance is very characteristic, and in certain parts of Iceland it has given rise to the name "vinstrarfár" or "vinstrarplága," *i.e.* "abomasum disease."

If the animals are slaughtered, the most important change is found to be a purplish, dark, somewhat swollen patch in the abomasum; during the course of the disease this increases in size, and if the animal should be allowed to die of braxy the entire abomasum shows hæmorrhagic or sero-hæmorrhagic infiltration; the abomasum and the first part of the small intestine usually contain no food, but may often show a certain amount of bloody fluid. This hæmorrhagic inflammation may extend in a forward direction, implicating the other stomachs, or backward, invading the small or both small and large intestines. The other parts of the intestinal canal are congested. The pleural and peritoneal cavities contain a little serous fluid. The blood is dark in colour, but may be clotted; the spleen is at times somewhat swollen, at others normal. The liver is usually light-coloured, soft, and degenerated; occasionally this degenerative process is extremely marked, but due allowance should always be made for *post-mortem* change. The kidneys may appear degenerated; in many cases they are enlarged and soft, or almost fluid in consistence. The carcass decomposes very rapidly; within a short time of death the belly is distended with gas, the rectum protrudes at the anus; the skin assumes a bluish colour in places, and the wool falls out; sometimes the skin bursts, revealing the presence in the subcutaneous tissue of a sero-hæmorrhagic fluid.

Braxy is, then, a primary violent hæmorrhagic inflammation of the abomasum, with or without secondary general infection.

A priori, it scarcely appears plausible that a disease like braxy should be entirely confined to so small a geographical area as Norway, Iceland, and the Faroe Islands, and the fact of its wide distribution in the former country would naturally suggest its occurrence in other parts where the surroundings and methods of treatment are similar. Such reasoning is confirmed by the discovery that braxy occurs in Great Britain, and especially in Scotland. Under this name has been recognised for at least one hundred years a disease which every winter causes enormous loss, and which so exactly corresponds to the "bradsot" of Norway, that no reasonable doubt can exist of their essential identity. At the same time it is clear that under the head of "braxy" a number of other and foreign diseases have been included which are not braxy at all.

Of the many articles on this subject contributed to English literature, by far the majority are from farmers and shepherds; those from veterinarians being few and far between.

The Highland and Agricultural Society of Scotland has done much to explain the nature and method of spread of braxy by its system of offering premiums for the best essays on the subject. In 1803 Professor Duncan contributed a number of reports. In 1828 the Society published a lengthy and excellent investigation by William Hogg, in 1861 a paper by James Cowan, and in 1862–3 a prize essay by William Robertson. In 1881 the Society appointed a Commission to investigate the disease; this recorded some facts with regard to the distribution of the disease, showing that it occurs in most parts of Scotland, though to a varying degree, but very little else, and appears to have given most of its attention to another disease, "louping-ill." In the chief English and Scotch agricultural journals and in the veterinary periodicals are a large number of short articles on the subject, which, however, throw no essentially new light on it.

From a careful study of the two it seems quite certain that the Scottish "braxy" is identical with the Norwegian and Icelandic "bradsot;" it appears at the same season, and is intimately connected with climatic influences; it runs its course so rapidly that animals left healthy at night are found dead in the morning; and the pathological anatomy of braxy is the same as that of "bradsot."

The oldest Icelandic reports (Hastfer, 1761) suggest that braxy is caused by the reception of some "poison," and later authors have sought the cause of the disease in

insects swallowed by the sheep, in consumption of injurious plants, in inclement weather, in the sea, air, &c. In 1800 Abildgaard and Viborg classed the affection as a form of anthrax, and their description of anthrax in sheep is evidently based on observation of braxy. Viborg afterwards declared braxy non-contagious, and belonging to the "charbonous" order of disease; Jónsson was of a similar opinion, except that, in conformity with later views on anthrax, he declared the disease contagious.

In Scottish writings we find advanced a number of suggestions as to the cause. Thus Hogg was of opinion that during stormy weather, when the ground was thickly covered with snow, the sheep were forced by hunger to eat the frozen, rough, indigestible portions of grass and withered fern which projected above the general level, and these irritating the stomachs gave rise to the symptoms. Cowan and Robertson incline to the belief that the disease is a kind of constipation produced by young sheep, previously accustomed to soft juicy food, being obliged during the winter months to consume dry, withered and indigestible fodder. In several Scottish and a few English writings bright moonlight is suggested as one of the causes: "One will then be sure to find next morning one or more sheep dead of the disease." In 1809 G. St. Mackenzie attempted to explain this idea by suggesting that whereas on dark nights the sheep sleep and digest what has been eaten during the day, on bright nights, on the contrary, they continue feeding, and thus overload the stomach, producing acute inflammation. This "explanation" recurs frequently in later publications.

In the present state of knowledge it is, of course, impossible to believe that a disease like braxy is dependent on simple distension of the stomach, or on the presence in it of excessive quantities of indigestible material, or of fragments of wood, &c.; a violent hæmorrhagic inflammation, beginning in a single small spot in the mucous membrane, and extending thence further and further, producing well-marked sero-hæmorrhagic infiltration, in many cases degenerative changes in internal organs, and finally killing the animal in a very short time, cannot but be of infectious origin.

Abildgaard and Viborg include braxy under the head of anthrax; and Williams, writing in 1882, regards it as a form of the same disease, though he since appears to have modified his ideas. Harvey, at an important meeting,

declared himself against such suggestions, and referred the disease to the action of an as yet unknown bacillus. The fact that it appears only in autumn and winter at once serves to distinguish it from anthrax; further, in Iceland anthrax was absolutely unknown until a few years ago, and was then introduced by imported hides; and, again, in spite of the fact that (until recently at least) no particular precautions were taken, either in the Faroe Islands or in Scotland, to prevent the infection of other animals, and that the flesh of sheep dead of braxy was extensively used for human consumption (see *Edinburgh Veterinary Review and Annals of Comparative Pathology*, vi, 1864), no case has ever been recorded of the disease being conveyed to man or to animals other than sheep. Both in England and Scotland numerous examinations of the blood for anthrax bacilli, and attempts at inoculation of other animals (than the sheep) have been made, but have always proved fruitless.

To Ivar Nielsen, of Bergen, must be ascribed the honour of elucidating the ætiology of braxy. During the course of investigations, published in 1888, he found, partly in the local lesions of the intestinal track, partly in the capillaries of the internal organs, a special bacillus, easy to distinguish from that of anthrax, of which he gives the following description:

"The bacilli (*B. gastromycosis-ovis*) are oval, of a length varying from 2 to 6 micromillimetres, and a thickness of 1 micromillimetre. They are often in pairs, arranged in a straight line or meeting at an angle; in the former case, and especially if deeply stained, the pair may present the appearance of a single bacillus. Occasionally they form long chains. Near the centre of the bacillus, but not always centrally placed, may often be found a zone measuring more than half the total length of the bacillus, and exhibiting little or no coloration. It appears as though the stained portions gradually contracted, finally forming two deeply coloured masses at the poles of the lemon-shaped bacillus, which then somewhat resembles the bacillus of rabbit septicæmia, except that the unstained part of the braxy bacillus is larger and more rounded, appearing to be bulged out literally. In dry preparations the bacillus is easily recognised on account of the highly refractile character of the colourless portion; but in sections careful search is often required, especially if the section be somewhat thick. Whether the colourless portion represents a spore I cannot at present say, though such appears pro-

Fig. 1.

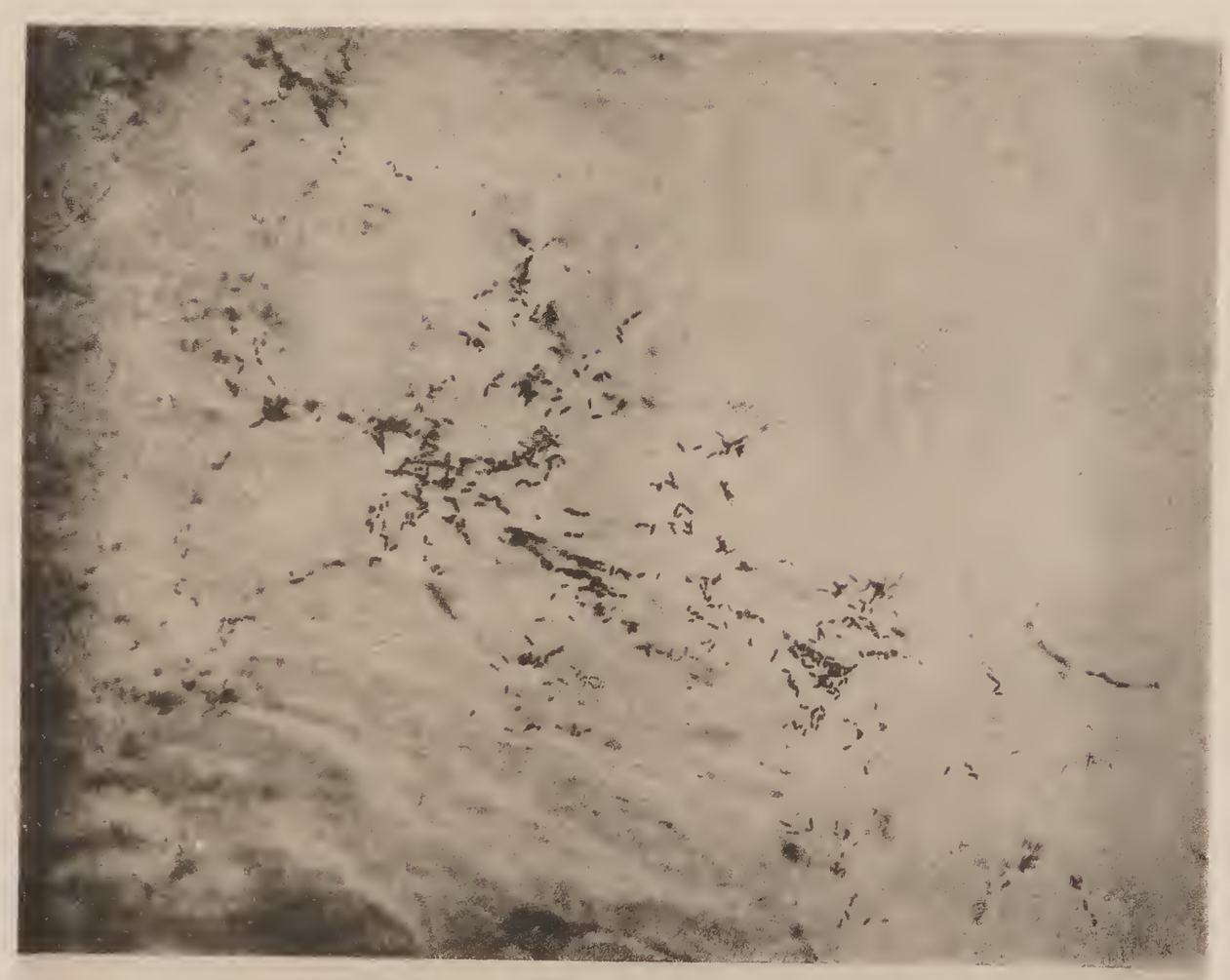


Fig. 2.

bable. The bacillus is always found in the mucous membrane of the abomasum, and especially in the submucous and subserous connective tissue. In the other organs the bacillus may be present in considerable numbers, or, on the other hand, may be impossible to detect."

Ivar Nielsen further speaks of attempts at pure cultivation of the organism. At the time of publication he thought to have succeeded, having isolated an aërobic bacillus corresponding to the above, which he obtained from the abomasum. Somewhat later, however, he concluded that this particular bacillus was not that of braxy. In the summer of 1888 he worked for some time in the research laboratory of the Copenhagen School, and made a number of attempts to obtain a pure cultivation. Beginning with a piece of dried kidney tissue from a sheep dead of braxy, he isolated an anaërobic bacterium which was pathogenic for guinea-pigs and mice, in which it produced a disease resembling symptomatic anthrax or malignant œdema. The experiments, however, led to no conclusive result. In a later popular treatise Nielsen describes the disease with greater thoroughness, and states that the bright spot in the bacillus is really a spore; he shows the non-spore-bearing bacilli as somewhat long, staff-shaped bodies with rounded ends. He lays stress on the abundance of bacilli in the inflamed parts of the alimentary canal, and says that both immediately after death and also when degenerative changes had occurred in the internal organs he had found the bacilli, some of which always showed spores ; that, on the other hand, when degenerative changes were less marked in the kidneys and liver no bacilli were to be found in the internal organs, apparently suggesting the conclusion that in such cases death is due to intoxication produced by a toxin elaborated in the inflamed abomasum and bowel. He further states that the bacillus is anaërobic, shows a characteristic growth on agar-agar, and produces an offensive smell.

All attempts at infection with the bacillus failed, whether food were moistened with cultivations or the material injected subcutaneously. In the latter case there was, as a rule, only a little local swelling, which, however, seemed to be followed by immunity against "spontaneous" infection. Guinea-pigs, however, seemed to take the disease on subcutaneous injection.

Up to the present these are the only bacteriological investigations published, although it should be mentioned that in 1884 Dr. Ringberg communicated to Professor

Jensen that he had found in the blood and organs of a sheep, slaughtered whilst in the last stage of the disease, a number of bacilli, reminding one of the bacillus of malignant œdema; that the bacilli refused to grow in any of the usual media, and that when sown in gelatine they failed to increase. A photomicrograph showed rods and oval spore-bearing bacteria which certainly presented a close resemblance to the bacilli of braxy.

The great losses caused in Iceland during certain years by outbreaks of braxy have resulted in veterinary surgeons being sent from time to time to investigate the disease, though up to the present the practical results have been very meagre. At the beginning of last winter the Government of Iceland called in the services of the Norwegian veterinary surgeon, Bruland, to investigate the disease, which was committing great ravages. He returned in February with a number of preparations which, however, were in such a state that little was to be expected from bacteriological investigation. As, however, the bacillus is spore-bearing, and the spores are very resistent, I was able to isolate from almost all the preparations a pathological bacillus identical with Ivar Nielsen's bacillus, which must be regarded as the cause of braxy.

From one sheep (No. 14) Bruland had made a number of cover-glass preparations by smearing the glass with a fragment of kidney, and simply drying it without further preparation; he also brought home fragments of kidney preserved respectively in glycerine and in alcohol. The latter contained a great number of bacilli, some with uncoloured points in the centre, and exactly corresponding with Nielsen's bacilli, of which I possess specimens. The cover-glass preparations also showed a number of bacilli, most of which were short and thick, and contained a brilliant central spore which resisted coloration; in addition, there were longish rods with rounded ends. In the glycerine preparations were a great number of bacteria spores. On sowing a mixture of gelatine, agar, and ox-blood serum with portions of the glycerine kidney preparation large numbers of colonies developed, most of them of one kind only, in the course of a day. One of the cover-glasses was pulverised in a mortar, and the powder similarly sown; in this case also large numbers of colonies developed, almost all being of one kind.

I was in addition provided with cover-glass preparations from two other sheep which had died from "spontaneous"

braxy, but could detect no bacteria in them. Portions of the pulverised glasses were sown: that from one sheep gave no result; that of the other, however, gave colonies similar to those from sheep No. 14.

From a fourth sheep Bruland brought a fragment of kidney in glycerine, and the entire inflamed abomasum preserved in diluted spirit. Microscopical examination of the kidney failed to detect bacteria, but cultivations in serum-gelatine-agar were more successful, the organisms resembling those above described. As it is well known how very resistent are spores to the action of chemical substances, I made some cultivation experiments with the submucous membrane of the abomasum, although the latter had lain in weak spirit for at least seven weeks. Nevertheless an enormous number of colonies was obtained, which in all essential respects resembled those obtained from other braxy specimens.

Finally I received a small specimen of blood preserved in a hermetically sealed glass tube. This blood was putrid and stinking, and contained countless thousands of all kinds of cocci and oval bacteria. Regarding it as impossible to obtain cultivations in the ordinary way, I diluted the fluid with water and boiled it for a short time. I thus succeeded in killing the non-sporogenic bacteria, and by sowing on serum-gelatine-agar obtained a number of colonies of exceedingly virulent braxy bacilli. At a later period I was handed a little dried kidney substance from two cases of spontaneous braxy, which on being sown yielded the usual colonies.

In addition to the above I received a number of cover-glasses smeared with the muscle juice of a sheep, which had died thirty-six hours after being subcutaneously inoculated with a little of the kidney substance from a braxy carcass. The sheep from which the preparations were made showed *post-mortem* appearances closely resembling those of symptomatic anthrax (black-quarter), *i. e.* violent hæmorrhagic inflammation in the muscles and loose connective tissue at the point of inoculation, accompanied by the free production of gas. The muscle juice, liver, and spleen contained bacilli, some bearing spores, whilst the liver afforded plain rods only. With the liver of this sheep Bruland made a number of inoculations, one of a calf which did not suffer in any way, and one of a sheep which died like the first described. In the cover-glass preparations I found a considerable number of spore-bearing bacilli of the usual appearance, and by sowing

fragments of a broken preparation in serum-gelatine-agar I obtained a great number of the characteristic colonies.

I was thus able from almost every one of the specimens submitted to isolate a distinct spore-bearing bacillus, which from its appearance and from the number of its colonies must be regarded as absolutely identical with that found microscopically in the preparations described above.

In order to make a comparison between the cultures from the Iceland specimens and those of Norwegian braxy, I applied to Herr Ivar Nielsen, who very kindly provided me with a portion of dried kidney substance from a sheep dead of braxy. Within twenty-four hours of sowing minute fragments of this in serum-gelatine agar a great number of the usual rapidly growing, gas-producing colonies appeared. There was not the slightest difference between the cultures from Icelandic and Norwegian specimens respectively. There seems, therefore, no doubt that Nielsen's bacillus is really the cause of braxy.

With the pure cultures obtained from the Iceland specimens I have made a series of inoculation experiments on various animals.

In spite of repeated attempts I have failed to infect sheep through the alimentary canal, and it therefore seems certain that for the production of braxy other factors than the mere reception of the bacillus are necessary; a sheep even which had been kept fasting for twenty-four hours, and then been fed on thistles moistened with spore-bearing bacilli, remained healthy. The negative result of this experiment confirms Nielsen's finding; he fed two lambs with fragments of the inflamed abomasum of a dead sheep, but failed to produce any serious symptoms.

I also subcutaneously inoculated three lambs, with the same results as Bruland. All three died in from twelve to fifteen hours from a disease closely resembling black-quarter. All showed well-marked hæmorrhagic œdema in the subcutaneous tissue, extending from the point of inoculation inside the thigh over the hind part of the body and under the belly; extensive bleeding had also occurred in the muscular structures of the thigh, and to some extent in those of the abdomen and in the panniculus, staining the parts of a purplish-black colour: at all points, and especially in the muscles, emphysema was well marked. The abdominal cavity contained a little blood-stained fluid, and beneath the peritoneum slight emphysema could be noted. This may, however, have been of *post-mortem* origin. The

spleen was in all cases somewhat enlarged, the liver yellowish and degenerated, and the lungs very œdematous. In one lamb the kidneys were somewhat soft and degenerated, in the other two almost pultaceous,—a change which in cases of spontaneous braxy may be regarded as exceedingly characteristic.

Microscopic examination of the muscle juice revealed the presence of great numbers of rods with rounded ends, many of which contained large, highly refractile spores.

The internal organs of one lamb contained a comparatively small number of bacilli lying singly or in chains, but exhibiting no spores; cultivation, however, proved these bacilli to be identical with the others. The other two lambs, after being kept for six hours in a cold room, were slaughtered, and their internal organs found to be crammed with spore-bearing bacilli, indistinguishable in appearance from those in the preparations made from "spontaneous" cases.

Of the three lambs described, one was inoculated with $\frac{1}{30}$ of a c.c. of serum-gelatine-agar culture.

A calf, about six or seven weeks old, was subcutaneously inoculated on one side of the chest with 2 c.c. of a two-day-old serum-bouillon culture. Sixteen hours after a distinct swelling had developed, but the general condition remained undisturbed, and the calf could rise and move about without difficulty. Six to seven hours later, however, the animal showed a disinclination to stand, and the swelling had become somewhat emphysematous. Next morning it appeared better, standing up and feeding, but it nevertheless died about forty-eight hours after inoculation. *Post-mortem* examination disclosed a certain amount of subcutaneous œdema around the point of inoculation; the underlying muscles were greyish and soft over an extensive area, and showed some emphysema; small isolated hæmorrhagic spots could be detected here and there. These changes in the muscle tissue were traceable over the entire side of the chest, and to some extent on the upper part of the limb. The abdominal cavity contained a little blood-stained fluid; the internal organs showed traces of degeneration.

Fluid from the œdematous spots was found to contain numerous bacilli, some exhibiting spores; the internal organs, however, furnished few bacilli.

The appearances in the calf, therefore, differed widely from the lesions of symptomatic anthrax, while those in

the sheep strongly suggested that disease. A six months pig was subcutaneously inoculated in the perinæal region with a little of the deposit from an old culture. It died in about thirty-six hours, showing a diffuse purplish-red swelling extending the entire length of the belly. On section this was found to be due to an abundant sero-sanguineous infiltration of the subcutaneous tissue, and was accompanied by a certain amount of emphysema. The muscular tissue of the thigh was much changed, and showed local hæmorrhages as well as some emphysema.

All the guinea-pigs inoculated died in from twelve to sixteen hours, and on *post-mortem* exhibited appearances closely resembling those of symptomatic anthrax or malignant œdema in this animal.

Rabbits appear less susceptible; four were inoculated, but only one died. The appearances were as above. The others only suffered slight local swelling.

On the other hand, pigeons and hens take the disease readily; all those inoculated died in from twelve to eighteen hours, the pigeons with extensive hæmorrhages in the muscles, whilst the hens only showed pallid, emphysematous muscles and a varying amount of subcutaneous œdema.

Two mice died with extensive subcutaneous œdema.

The bacillus, therefore, produces at the point of inoculation an intense hæmorrhagic inflammation; under certain circumstances it enters the blood-stream, and may sometimes be found there after death in large numbers. At first sight it appears remarkable that all efforts at inoculation by feeding should fail, but the seeming anomaly is perhaps capable of explanation. Firstly, it is well known that in several other infectious diseases considerable difficulty exists in bringing about infection in the natural fashion. For instance, experimenters have often failed to produce swine erysipelas (Rothlauf) either by subcutaneous inoculation or by feeding with cultures, or with the tissues of dead pigs; further, all experience goes to show that braxy only appears under very specialised circumstances, viz. when hungry sheep are grazed over frozen fields where the food is rough, partially indigestible, and frozen (in Scotland dry fern, which is very indigestible, has been specially blamed). A certain temporary combination of circumstances, therefore, appears necessary for natural infection, and it is clearly exceedingly difficult to ensure such combination by artificial means.

Bearing in mind the foregoing, there can be little doubt it explains the more important ætiological features of the

disease. The same bacillus has been found in the tissues of affected sheep both in Norway and in Iceland ; the bacillus, when subcutaneously injected, produces a violent hæmorrhagic inflammation of the same character as one finds in the abomasum in cases of spontaneous braxy, and the local changes at the point of inoculation may, just as in spontaneous braxy, be accompanied by a general infection with degeneration of different organs, and with softening of the kidney substance.

The bacillus of braxy is anaërobic. In cultures it develops considerable quantities of gas, just as it does when inoculated into the tissues. It is closely related to the bacillus of symptomatic anthrax, which it somewhat resembles in general appearance, and of which it reminds one by its ability to produce hæmorrhagic inflammation in the muscular tissues. It is distinguished from the last named, however, by being pathogenic to swine, mice, pigeons, and poultry, which are not killed by the bacillus of symptomatic anthrax.

Cultures of the braxy bacillus resemble both those of the bacillus of symptomatic anthrax and of malignant œdema ; all three grow both in gelatine and in agar-agar or gelatine-agar ; all liquefy gelatine and produce gas ; all three are also very sensitive to slight changes in the alkalinity of the medium, though this is true in the highest degree of the braxy bacillus, which often fails to grow in agar, in which the others do very well ; but on this point I cannot deliver a final opinion. The braxy bacillus grows slowly at the ordinary temperature of rooms, much more slowly than others, whilst at the body temperature it grows as strongly or even more vigorously ; at the present time I am unable to give final indications for distinguishing between the gelatine and agar-agar cultures of the three bacilli, the differences being slight.

Whilst the braxy bacillus grows somewhat slowly in gelatine and agar, it flourishes excellently when blood-serum is added, and the rapidity of growth increases with the amount of serum added. For instance, by growing the bacillus at 37° C. in tall glasses containing a mixture of $\frac{3}{4}$ agar and $\frac{1}{4}$ ox serum, a number of colonies varying from the size of a millet to that of a hemp-seed, and numerous bubbles of gas will be found in the deeper strata in about twenty hours. With a mixture of equal parts, however, the colonies will in the same time attain a diameter of $\frac{1}{2}$ to 1 cm. The same is true of stab cultures. Fig. 1 shows in the centre a twenty-four hours old stab

culture made in the above-named serum mixture; for the purposes of comparison bacilli of malignant œdema and those of symptomatic anthrax have also been sown; the specimens show that the latter grow less rapidly, and at the period mentioned had not produced any gas bubbles. I have found a mixture of bouillon and serum in equal parts an excellent cultivating medium for braxy bacillus. By placing this in a suitable flask, which can be filled with hydrogen after sowing, the fluid will be found quite turbid after twenty-four hours at a temperature of 37° C., and in three days teeming with perfect spores.

Although, *a priori*, it appears very unlikely that the bacilli of braxy and of symptomatic anthrax are identical, amongst other reasons because symptomatic anthrax does not occur in Iceland, yet on account of the close resemblance between "inoculation braxy" and black-quarter I have given considerable attention to the point. As already noted, I found the braxy bacillus pathogenic for a number of animals that are not affected by that of black-quarter, and I have also been able to trace distinct, if not striking, differences between their cultivations. To make more certain I made an inoculation experiment on a sheep. By the injection of a minute quantity of dried muscle from a braxy sheep this animal was rendered immune against braxy, so that it was afterwards proof against the injection of relatively very large quantities of braxy material; at this stage $\frac{1}{5}$ of a gramme (about 3 grains) of dried muscle juice from an ox dead of black-quarter was injected. (The powder was kindly furnished by Professor Kitt.) In thirty-six hours the sheep was dead of symptomatic anthrax. It is, therefore, clear that the inoculation with braxy material had conferred no immunity against symptomatic anthrax.

The bacilli of braxy, malignant œdema, symptomatic anthrax, together with Ivar Nielsen's shortly described bacillus of whale's septicæmia, and Thoma's bacillus of malignant emphysema (found in extensive subcutaneous inflammation and emphysema in man), and certain others less well known, form a group of closely allied bacilli resembling one another in form, in being anaërobic, and in producing a sero-hæmorrhagic inflammation and emphysema, but differing in the manner of producing their effects. Certain, for example, induce excessive gas formation, others intense hæmorrhagic infiltration in the muscles, whilst some again lead to extensive subcutaneous œdema.

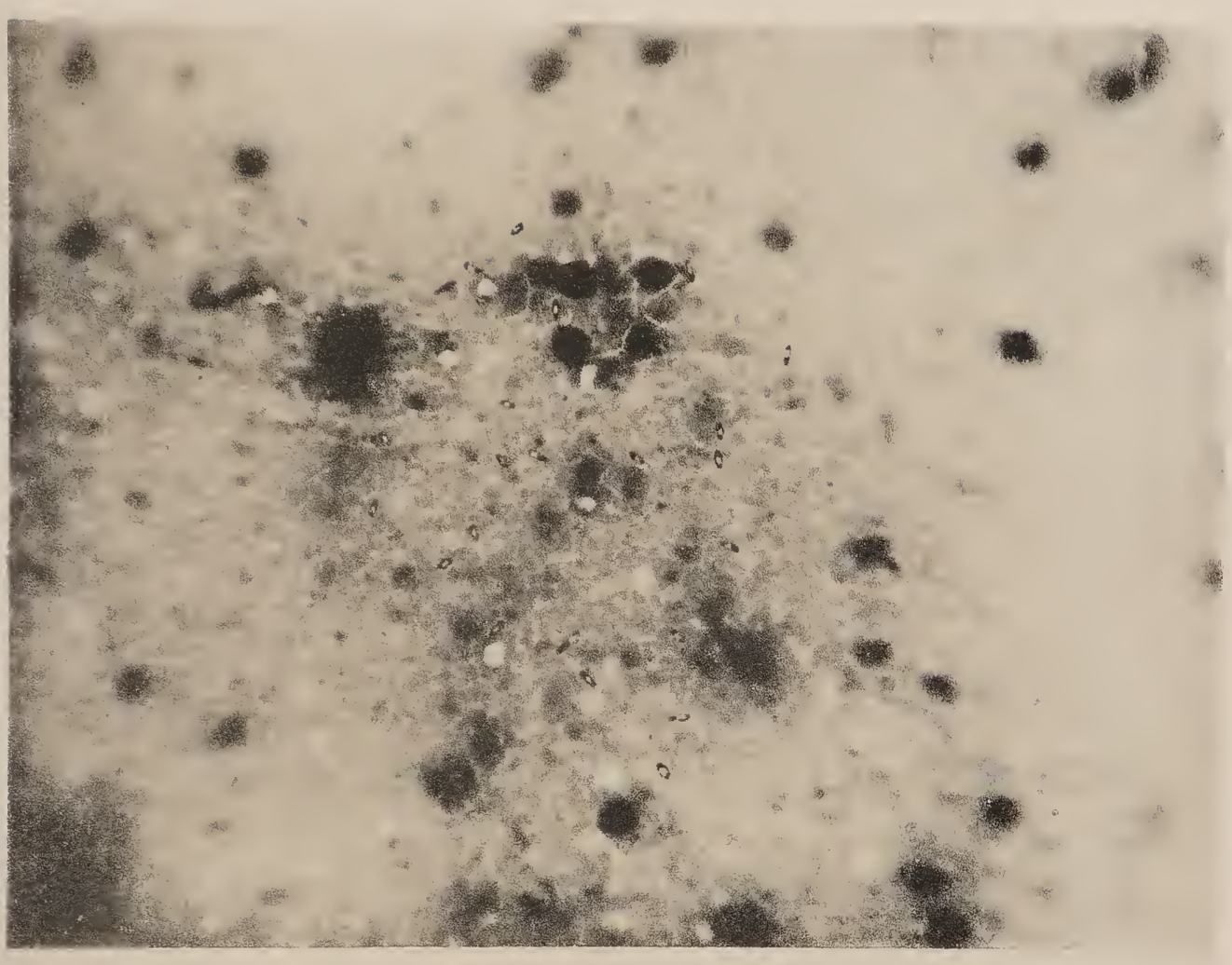


Fig. 3.

Fig. 4.

Ivar Nielsen attempted to vaccinate against braxy by a method resembling that used in symptomatic anthrax. He dried the diseased kidney tissue, and injected subcutaneously small quantities of the material thus obtained suspended in water. A slight local inflammation followed, which appeared to protect against later "spontaneous" infection. He has used this method in his own district, and states that it is also practised to some extent in Iceland. As far as one can judge—and of course a just opinion is very difficult to form—these inoculations appear of value.

On the other hand, their worth has not been proved experimentally. As, however, the bacillus has now been cultivated, it is perfectly easy to carry out vaccination experiments; nor should it be difficult to prepare a reliable and constant incculation material. Up to the present I have only made one vaccination experiment, the results of which appear to indicate that Nielsen's claims are well founded. A one-year lamb was inoculated with a minute quantity of dried powdered muscle from a lamb which had died in the laboratory; the next day the lamb walked lame, would not eat, and had a red painful swelling at the point of inoculation. This disappeared after some days, and on the second day the general condition was again good. About ten days later the same animal received $2\frac{1}{2}$ c.c. of a virulent serum-gelatin-agar culture; it appeared rather unwell for half a day and walked lame, but soon recovered. At the same time I inoculated another and somewhat larger sheep with only $\frac{1}{30}$ c.c. of the same culture ($\frac{1}{75}$ of the former dose); the animal died in fifteen hours.

The result of this experiment, considered in conjunction with the good results of inoculation for symptomatic anthrax, would seem to indicate that Nielsen's method of vaccination against braxy may yet prove of the greatest possible value. The method will doubtless require modification in its details; for instance, it seems undesirable to use a material like dried kidney substance, the number of spores in which must of course greatly vary, especially as by cultivation in serum-bouillon it is possible to produce "mass" cultures, and thus to furnish a far more constant material for inoculation. In the same way it is dangerous to employ the material without first subjecting it to some process of attenuation, because although the bacilli may be expected to have undergone a certain degree of attenuation during the process of drying, and although in very small doses they may no longer be able

to kill sheep, yet such accidents are not impossible even in careful hands. Nielsen has himself pointed this out, but owing to the difficulties of his position he has not been able to undertake a systematic and experimental investigation of the vaccination question.

In the present state of our knowledge it would appear that this disease might be looked on as a kind of "alimentary black-quarter" (the German term is Fütterungsrauschbrand, lit. "feeding" black-quarter [Jno. A. W. D.]), though it is caused by another kind of bacillus. It therefore attains considerable importance in connection with the question of how (*i. e.* by what channel) black-quarter infection occurs. Certain pathologists maintain that black-quarter is produced by the reception into the alimentary canal of infectious material, despite the fact that no symptoms of local inflammation can be discovered either in stomach or bowel. Kitt states that he has only twice succeeded in producing the disease by feeding with infected material, and that even in these cases there was no intestinal lesion, but that the disease manifested itself as usual in the extremities. In braxy, which is caused by a very similar bacillus, the entrance of the bacillus causes very marked changes in the abomasum, and it therefore seems improbable that in black-quarter the conditions would be so entirely different, and that the bacilli could penetrate the gastric and intestinal walls without producing some local inflammatory process.

KEY TO PLATES.

Fig. 1.—Twenty-four hours old stab cultures of malignant œdema bacillus (right), braxy bacillus (centre), and malignant œdema bacillus (left). (Natural size.)

Fig. 2.—Section of kidney from Norwegian sheep dead of braxy. The contour of the kidney substance is indistinct. (Circa × 500.)

Fig. 3.—Cover-glass preparation of rubbing from kidney. Subject, Iceland sheep dead of spontaneous braxy. (× 1060.)

Fig. 4.—Cover-glass preparation of muscle juice from sheep inoculated with braxy. (× 1060.)

The photomicrographs 2 to 4 were made by Herr Professor Storch, and have been reproduced for the *Veterinarian* by the Automatic Engraving Company.

AN INVESTIGATION INTO THE NATURE, CAUSE, AND MEANS OF PREVENTING THE CORNSTALK DISEASE (TOXÆMIA MAIDIS) OF CATTLE.*

By Veranus A. Moore.

The name "cornstalk disease" has been given to a somewhat mysterious affection from which cattle sometimes suffer while feeding in cornstalk fields late in the fall and early winter. The meaning generally accepted and intended to be conveyed by this term is, that an animal or a number of animals, usually cattle, have died suddenly either while feeding in a cornstalk field or very soon afterwards. From a pathological standpoint, therefore, the term is meaningless, but it has served admirably as a generic term to designate certain fatalities which were not easily explained otherwise. Geographically, this affection is restricted to those sections of the United States where the farmers harvest their corn by picking the ears from the standing stalks, after which cattle are turned into the cornstalk fields. At present, therefore, it is limited in its distribution to the middle and northern portions of the Mississippi Valley.

The disease is very insidious, frequently causing the death of the animals before its presence is suspected. Farmers in the affected region frequently observe that their cattle act perfectly well at night, and on the following morning one or more of them are dead. Local veterinarians and butchers, in making autopsies on the dead animals, report the failure to find lesions sufficient to cause death. Usually all the animals in a herd which die perish in a single night, or, at the longest, within a few days after the first death occurs. It is generally believed to be invariably fatal, and its symptomatology has not been fully determined.

This affection of cattle has been known to exist for many years. The place and time of its origin, however, are not known, but it seems to be peculiar to the United States, and to have first appeared west of the Alleghany Mountains. Farmers tells us of its occurrence in the Mississippi Valley forty or more years ago. They usually refer to its extensive ravages in 1864–5, and again in 1868. From an historical standpoint, no positive state-

* Report from U.S. Board of Agriculture.

ments can be made concerning it prior to 1868, when the first recorded investigations into its nature and cause were made. After that time the disease seems to have escaped the attention of investigators until 1889, when Dr. Frank S. Billings, of the agricultural experiment station of Nebraska, published the results of his investigations. His "germ theory" and the wide distribution of his publications gave to this disease of cattle an unwarranted conspicuousness, and did much to direct attention to the malady, which he set forth as one of vast economic importance. This aroused the fears of cattle raisers, who depended in part or wholly upon corn fodder to winter their animals, and revived both the interest in this disease and the fear of it.

A careful review of the recorded statements shows that many causes have been assigned to it. The various theories have, for the greater part, been formulated by farmers, cattle raisers, and local veterinarians, and, as might be expected, they are based very largely upon the history of a limited number of outbreaks. A more careful inquiry into the origin of these theories shows that as the disease, with occasional exceptions, occurred in only one or two herds in a neighbourhood during the same season, the local conditions affecting these herds were supposed to be favorable to the disease, if not its exciting cause. It would be useless to attempt a consideration of all the causes which have thus been suggested. There are, however, certain theories which appear to possess a greater or less degree of probability, and which cannot be gainsaid without positive evidence to the contrary.

It is a curious fact that, while nearly every cattle owner in the sections where this disease prevails, in his experience, entertains one of the popular theories respecting its cause, the other supposed causes have proven to be erroneous, or for other reasons are believed to be spurious. There is no uniformity of opinion concerning its ætiology. The theories most commonly entertained are appended:

(1) A lack of salt and an insufficient supply of water.

(2) Feeding the cornstalks without an admixture of other food, such as hay, straw, grain, or pasture grass.

(3) Impaction of the third stomach (omasum) due to overfeeding upon the dry cornstalks.

(4) The ingestion of corn smut (*Ustilago maidis*).

(5) A species of bacteria which is found in the lesion of a disease of corn known as "corn blight," or the Burrill disease.

The first three of these theories are of popular origin, and are not supported by the general experience of cattle raisers, as will subsequently be shown. The "smut theory," which was somewhat strengthened by the report of Professor Gamgee in 1868–9, has many adherents. So firmly do certain farmers believe it to be the causative agent that they collect and draw out of the field all stalks affected with this fungus. The "germ theory," advanced by Billings, is believed in many sections to be the true explanation of the cause of this malady. The strong hold which the last two theories have on the farmers and cattle raisers of the West, and the inconvenience and often expense involved in carrying out the methods of prevention indicated by them, render necessary a brief consideration of the facts upon which these theories are founded, in order that the results of the investigations here recorded may be understood and properly interpreted. As will be shown, our investigations, which would have verified these theories if they were true, fail to confirm the correctness of any of them.

Investigations Prior to 1892.

The Investigations of Professor John Gamgee.

In 1868 Gamgee was employed by the United States Department of Agriculture to investigate the cornstalk disease of cattle. Although this disease had been known to exist for many years prior to that time, its ravages had not been sufficiently extensive to enlist any active inquiry into its cause or means of prevention. The "smut theory" appears to have been the prevailing one at that time, and consequently Gamgee's report* deals almost exclusively with the effect of improperly prepared food, smuts, &c. Corn smut prevailed to an unusual extent in 1868, and in order to test its ætiological value he carried out the following experiment:

> Forty-two pounds of smut free from extraneous material were collected and fed to two cows, together with a small quantity of corn meal and as much cut hay as they could eat. The smut was mixed with corn meal and wet for one animal; the other received it in a dry condition. At first the cattle received three ounces of the smut twice daily, but later the quantity was increased to twelve ounces daily. The animal that received the wet meal and smut gained in flesh; the other lost in weight. They were apparently perfectly well at the time the experiment was completed.

The only conclusion which seems to be justified from

* 'Diseases of Cattle in the United States,' U.S. Department of Agriculture, 1869, p. 73.

this experiment is the one Gamgee himself drew, viz. "that smut is not a very active poison in combination with wholesome food." Although the experiment with smut failed to demonstrate any ætiological value, he entertained the opinion that the smut and mouldy corn were the causative agents in the production of the disease.

In his report a somewhat interesting description of the symptoms of this disease is given. Although the symptomatology is quite exhaustive, the text is not clear on the point whether or not the symptoms were observed by himself or reported to him by the owners of the cattle. His description of the symptoms and pathological changes in animals affected with this malady is as follows :

Symptoms of the Ill Effects of Smutty Corn.—Cattle fed on smutty cornstalks first denote ill-health by constipation. It is true that a farmer may be attracted only by an animal lying down, with an unthrifty look, staring coat, dry muzzle, and perhaps trembling; or a steer may be noticed "tucked up," with hind limbs drawn under, head depressed, shivering, dulness of eyes, and anxious expression of countenance. In the third variety the animal seems excited, breathes quickly, and is apparently somewhat delirious; indeed, in the condition described by Mr. Cumming, of Ellen, Aberdeenshire, resulting from impaction of the third stomach, as in cases of lead poisoning, nothing is more strange than this delirium, associated as it is sometimes with blindness. A farmer writing me from the West says that when he tried to put a rope around the head of a sick cow, which he found standing with all the symptoms of sickness presented by other animals of the herd which had been with her in the corn-fields, she turned and fought furiously. I have seen an animal in this condition tied up in a stall, rush forward, plunge, strike against any obstacle, roar, moan, grunt in breathing, and appear to suffer acutely if touched or disturbed. In other words, with the impaction of the third stomach, which is the essential lesion of the disease, whether induced by smutty stalks, old indigestible stalks that have no smut, or other kind of food or poison, there are two distinct conditions induced,—the one of stupor, listlessness, vertigo, and depression of spirits, indicated by the animals standing sullenly until they drop or are relieved; the second is a state of exquisite sensitiveness, a hyperæsthesia of the skin and system generally. The animals are not only excited, but in a state of actual suffering, and die very speedily in a state of coma or in convulsions. The disease does not last long. I have seen an animal linger on four or five days, but usually the whole course of the malady is run in twenty-four to forty-eight hours.

An animal first seems to show costiveness, with a dry mucus over the scanty excrement; and although apparently undisturbed, and even feeding, may be dead in twelve to twenty-four hours.

The diagnosis of the disease at an early period of its manifestations is therefore important, and it rests on the knowledge of the manner in which animals have been treated and fed (as the simultaneous attack of several animals shows), and especially on the observations of a fact that I have usually noticed, that the animals which have eaten most ravenously have been the first and most severely affected. Old cattle may sometimes avoid the smutty food, and young animals eat heartily; the latter will be found the only ones to die.

Post-mortem Appearances.—The state of torpor of the alimentary canal of

animals affected with this disease is indicated on opening the belly and exposing the stomach to view. In the first stomach, or paunch, corn husks and corn are found in a dry condition. Sometimes the rumen is very full, and gas may have become disengaged in it so as to cause great distension, which is relieved by puncture. The contents of the second stomach, or reticulum, are in the same condition as those of the first, though sometimes mixed with some fluid. The third stomach (manyplies or omasum) is firm, distended, and on being opened the food is found caked between folds, with marked impressions of the papillæ or little eminences which stud the mucous membrane. We find in almost all fevers a similiar condition of the third stomach, and indeed in healthy animals it is that part of the digestive organs in which the food is most dry and packed preparatory for solution by the gastric juice and intestinal secretions. But there are other lesions associated with this "caking" of the food in the third stomach, in specific diseases, and its existence without these affords evidence of a primary form of impaction, which has received remarkable names, such as "staking," "bound," "fardel bound," &c. The fourth stomach contains but a scanty quantity of greenish, semi-digested matter, is usually reddened somewhat diffusely, and the redness increases at times towards the opening of the small intestines.

The intestine, usually replete with somewhat solid and imperfectly digested food, is usually high-coloured, especially in the fundus of the cæcum and in the large portion of the colon. The rectum is the seat of ramified redness, and a consistent mucus coats its contents.

Persons have reported a peculiar black colour of one lung. This is due only to stagnation of the blood after death in the organ nearest the ground, and the same kind of congestion or settling of the blood is apt to pervade other tissues and organs in the side on which the animal has been lying.

The Investigations of Dr. F. S. Billings.

In 1889 Billings described the cornstalk disease* as an "acute extra-organismal septicæmia, due to micro-organisms belonging to the class of ovoid-belted germs, to which variety of disease also belongs the swine plague, southern cattle plague, Wildseuche, hog cholera, and yellow fever in man."

In January and March, 1888, and in February, 1889, he had occasion to examine pieces of tissue brought from cattle that had died while feeding in cornstalk fields. In the first case the tissues were sent in an unsterilised bottle. From the bits of organs which he thus received he invariably isolated a bacillus which he affirms to be the cause of the disease.

The most interesting part of his investigations was the supposed discovery of the identity of the bacillus which he found in the animal tissues with the one described by

* 'Bulletin of the Agricultural Experiment Station of Nebraska,' Nos. 7, 8, 9, and 10; 'Original Investigations of Cattle Disease in Nebraska, 1886—1889, University of Nebraska,' 1889, p. 164.

Burrill* as the cause of a disease in cornstalks. This hypothesis is supported by the fact that by feeding the diseased stalks to a rabbit he produced a fatal disease, and from the organs of the dead rabbit he obtained pure cultures of the bacillus. He sent a culture of his bacillus to Burrill, who stated that the organism which he (Billings) had obtained from the organs of dead cattle appeared to be identical with the bacillus which produced the disease in the cornstalks. The correspondence between these two investigators, published by Billings, shows that Burrill was conservative on this question, pointing out obvious resemblances only. The responsibility of the statement that the two bacilli are identical rests with Billings.

Dr. Billings found this micro-organism to be fatal to rabbits, guinea-pigs, and mice, when inoculated with small quantities of a pure culture. A rabbit fed with a pure culture died in four days, and pure cultures of the bacillus were obtained from each of the organs. A calf and a hog were inoculated subcutaneously with 6 c.c. of a pure bouillon culture. The hog remained well, but the calf became visibly affected. The temperature rose to 41·5° C. (106·7° F.). It became very much emaciated, but eventually recovered. Six days after the inoculation he obtained a pure culture of the bacillus from the blood which he drew from a vein at the root of the tail. In a subsequent experiment he inoculated a calf in the jugular vein with 9 c.c. of a pure culture of the bacillus. The calf died in two days. He also produced fatal results in one of two pigs by feeding them with the viscera of the calf which died from the intra-jugular inoculation. The other pig sickened, but recovered. From the dead pig pure cultures of the bacillus were obtained.

As would be expected, the pathology of the disease which he gives is extremely meagre, owing to the fact that all the tissues he saw were brought to him in a few small bottles or jars. In a few cases they are said to have been much changed by decomposition. Nevertheless he found pneumonia to be one of the lesions characteristic of the disease, and in a subsequent bulletin† he places great importance upon this lesion, although he records very few additional observations to sustain the claim. In

* 'Proceedings of the Society for the Promotion of Agricultural Science,' 1889, p. 19.

† 'The Corn-fodder Disease in Cattle and other Farm Animals, &c.,' bulletin Nos. 22 and 23 of the Agricultural Experiment Station of Nebraska, 1892.

this publication, however, he attempts to show that chronic interstitial pneumonia in cattle is a sequel to the cornstalk disease. The argument is a confusion of statements from various English and French veterinarians which, for the greater part, appeared after the supposed discovery of cornstalk disease in American cattle at La Villette, France. The importance of lung lesions, which he emphasises in his second bulletin, appears to have been suggested by the following incident, which temporarily gave to this disease an undue importance from a commercial standpoint.

In 1890 a few animals from a shipload of American cattle landed at La Villete, France, died of pneumonia. They were examined very carefully by Nocard and other French veterinarians. From the diseased lung Nocard obtained a micro-organism which corresponded very closely to the description of the bacillus of the cornstalk disease of cattle in America, described by Billings The publication* of this fact gave rise to a temporary supposition that this American cornstalk disease might be a menace to the cattle of Europe, and consequently initial steps were taken to require American cattle to be quarantined against it. The fact was subsequently determined that the bacillus isolated by Nocard was that of a form of bovine pneumonia occasionally met with in America, but not known to be contagious, and the matter was dropped.

The symptomatology as described by Billings is confined to the inoculation disease. These symptoms, however, are so confused with those of swine plague and Texas fever that they are not of diagnostic value.

In a recent popular publication† Billings makes the following statements :

> It is now six years since I first discovered a germ in cattle sick and dying from being turned into stalk fields. In many cases I have carefully examined the whole field, and in some of the worst outbreaks smut was most conspicuous by its almost total absence. Again, Gamgee reports that the manure of his cows, which ate thirty-one pounds each, was black. In all the autopsies I have made—and they run up to the fifties—and among all the sick cattle I have seen there was not an indication of any discoloration of the manure unless it was abnormally light yellow in colour. Not only in every case personally examined, but in still more where blood and organs have been sent me, have I isolated one and the same germ, but have repeatedly produced the disease in cattle with inoculations of pure cultures. Some six weeks since I received some corn from a field in which cattle were dying in Indiana, and in the corn I

* Nocard, "Une Broncho-pneumonie infectieuse des Bœufs Américains," the Cornstalk Disease, 'Recueil de Médecine Vétérinaire,' tome viii, 1891, p. 424.

† 'Breeders' Gazette,' vol. xxvi, 1894, p. 340.

found the same germ. I inoculated rabbits with some small fragments of the diseased corn, and it killed them, and from them I made pure cultures and injected two cubic centimetres into the jugulars of two cattle (two-year-old), with the result of killing one and making the other very sick, getting the same germ from both.

So long as these people do not seek a germ in the cattle, so long as they ignore so much proof—and it must be remembered that the same germ has been found and proved in our cattle in France, and the same lesions reproduced by inoculation—so long have these men absolutely no right to advocate the smut theory.

He suggests as a means of prevention that all the diseased cornstalks should be destroyed, and animals which die of the disease should be carefully buried or burned. The suggestion is also made that in order to detect the presence of the disease the temperature of the cattle should be taken each night, and all animals which give a temperature over 100° F. must be looked upon as suspicious, and those in which it exceeds 102° F. as diseased.*

Investigation at the Illinois State Experiment Station.

A single experiment was made at Champaign, Ill., in 1890, in which the ætiological importance of corn smut was tested. A bacteriological examination of the organs from an animal that died in a cornstalk field, supposedly of this disease, was also made by Professor Burrill in 1889. A copy of the station experiment report, which I was told included all of the work which has been done on this disease at that place, was kindly furnished by Professor Morrow, with the privilege of publishing.

A Letter of Inquiry and a Summary of the Replies.

The absence of reliable data concerning the nature, distribution, and importance of this disease led to the issuing of a circular letter in 1891 to a large number of farmers and cattle raisers by Dr. D. E. Salmon, Chief of the Bureau, for the purpose of obtaining more extended information concerning this disease. Although the replies to the various questions in this letter cannot be considered from a scientific point of view altogether accurate, they were given in good faith, and indicate the ideas then entertained by interested parties concerning the nature of this disease. During the past few years, however, the

* It seems strange that such a statement as this should be made when standard German authorities give the normal temperature of cattle from 101° to 101·8° F. Dr. E. C. Schroeder, of this Bureau, who has had much experience in applying the tuberculin test for tuberculosis in cattle, finds that the normal temperature of cattle varies from 101° to 103° F.

"germ theory," as announced by Billings, has become better known through the publication of his results, and is more generally accepted as the correct explanation of this mysterious disease. Furthermore, the replies received are important in showing the economic importance attached to this disease by those who suffer most from its ravages.

There were received from the States of Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri a total of 634 replies. Of these, 394 reported that either they or their neighbours lost cattle in cornstalk fields the preceding year. Sixty reported the disease in horses, and curiously enough 32 of them resided in the State of Kansas. Eight reported it in sheep, and 6 of these were from Kansas. The disease was not reported to occur in other animals.

A perusal of the replies shows that the great majority of the affected cattle were on pasture land prior to turning them into the cornstalk fields.

The time that elapsed after turning the cattle into the cornstalks until death occurred is reported to be from four hours to two months. Of 328 answers, 48 stated that death occurred in twenty-four hours; 59 in two days; 45 in three days; 23 in four days; 20 in five days; 13 in six days; 47 in seven days; 51 in from one to two weeks; 15 in three weeks; 5 in one month, and 5 in from one to two months. A few others indicated its occurrence in from four to eight hours.

The symptoms given were very numerous. Indigestion, bloating, constipation, "crazy," "stupid," and "dry murrain" were stated to be indications of the presence of the disease.

Fourteen outbreaks were reported to have occurred among cattle which were supplied with salt but no water; 35 outbreaks occurred where there was plenty of water but no salt. In 254 of the outbreaks reported there was an abundant supply of both water and salt, and in 123 outbreaks the cattle received neither salt nor water.

In answer to the question concerning food other than the cornstalks, 302 people replied that no other food was given, while 107 owners fed hay, straw, grain, or allowed the cattle to run at will in pasture or meadow land (usually meadow). The reply to this question was omitted in over 200 of the returned letters.

Some men stated that low ground was most dangerous, others that the disease occurred upon high ground most frequently. The presence of smut (*Ustilago maidis*) was the only abnormal condition of the cornstalks reported,

and was indicated in about one third of the fields where the disease occurred.

The answers to the question whether the disease is becoming more frequent than formerly, or is disappearing, are interesting. Of those who replied to this question 115 stated that it was common, 50 stated that it was on the increase, while 264 wrote that it was decreasing, and a few others stated that there was no such disease.

Numerous methods for preventing the disease were indicated. Furnishing the animals with an abundance of salt and water and allowing them to remain in the stalk fields for only a short time each day during the first few days appear, however, to be the most common preventive methods. The removal of smut comes next. The fact that the disease appeared where these precautions were taken eliminates the desirability of considering them further than to point out the fact that thus far no efficient means of prevention has been adopted. A few of the customary preventive measures will be considered in connection with the outbreaks investigated.

Special Investigations.

Methods.

The investigation into the nature and cause of this disease was attended with many difficulties. The facts that the disease appears at irregular intervals over a large territory, that there is no certainty of its appearing or recurring in any particular locality, that the affected animals are usually found dead, and that frequently all the deaths in an outbreak occur in a single day, rendered the adoption of a method for procuring suitable material a matter of considerable difficulty. From the existing knowledge of the disease it was evident that laboratory work was quite as essential as *post-mortems* for the success of the investigation. The conditions mentioned rendered necessary the adoption of some plan whereby notice of the occurrence of the disease could be received promptly, and the affected herd visited in the shortest possible time. A careful consideration of these and other conditions necessary for this investigation led to the conclusion that some place within the infected district should be selected where the necessary laboratory facilities could be obtained, and from which it would be possible to reach the affected animals before it would be too late to make the desired observations.

In carrying out this plan arrangements were made with the authorities of the State experiment station at Ames, Iowa, whereby the use of their bacteriological laboratory was obtained. Further assistance was afforded by the co-operation of Drs. Stalker and Niles, of the veterinary department. Dr. Niles assisted in many of the *post-mortems* and in the laboratory work. Through the kindness of Professor Wilson, director of the station, a notice of the intended investigations was inserted in nearly all of the country papers and all of the agricultural journals of Iowa, requesting that notice of all outbreaks of this disease should be promptly sent to the State experiment station. About 100 letters were also sent by the chief of the Bureau of Animal Industry to cattle raisers who had replied to the circular letter of the year before, asking them to report promptly any outbreak of cornstalk disease in their locality, as steps were being taken to inquire into its cause and means of prevention. Through these arrangements it seemed highly probable that the opportunity would be given, in view of the extensive losses previously reported, to make careful observations on a considerable number of affected animals both before and after death.

Notwithstanding these preparations, it was found to be impossible to receive notice of the appearance of the disease, and to reach the infected herd before the disease was over and the dead animals in several instances advanced in *post-mortem* changes. The disease usually occurred from 100 to 300 miles from Ames, and as word was not sent until one or more deaths had occurred, and then by mail, it is evident that with the utmost promptness from one to four days must elapse after the time of the first death until the examination was made. It is a significant fact that in 1892–3 only one outbreak occurred near Ames, and in this instance one of the two animals that died was found dead, and the other was sick but two hours. However, several outbreaks were visited, and *post-mortem* examinations were made on a number of animals within a few hours after death.

The method of investigation followed in 1892 was to make careful *post-mortem* examinations, to make a large number of cultures from the different organs of all the animals that were in a suitable condition, to preserve in alcohol or Müller's fluid pieces of the tissue for microscopic examination, and to take to the laboratory at Ames large pieces of the organs for microscopic study while they were in fresh condition, and for additional cultures when

deemed advisable. A large number of cover-glass preparations from the blood* and various organs were also made at the *post-mortem*, and subsequently stained and examined microscopically.

In 1893 Dr. F. L. Kilborne investigated several outbreaks of the disease in Iowa. He made the *post-mortems*, and sent cultures and tissues to the laboratory of the Bureau, where they were carefully examined. Although this method was attended with many disadvantages, it was in a measure quite satisfactory.

From the symptoms of this disease reported in 1892, the possibility of its being an affection of the nervous system resembling rabies to a certain extent was suggested. This theory was strengthened by the existence of a disease among cattle at Green, Iowa, in the fall of 1892, which could not be differentiated from rabies by the symptoms manifested or by rabbit inoculations, and in which a history of a dog-bite could not be obtained. The determination of this point by rabbit inoculations, the repetition of the bacteriological work, and the carrying out of certain feeding experiments for the purpose of testing the extent of the infection in the cornfields where the disease occurred, were the lines of investigation followed in 1893.

The absence of recorded data on this disease has led to a somewhat detailed account of the conditions under which the various outbreaks occurred, and the appearances found upon *post-mortem* examination of certain of the animals. In the history of the outbreaks, as well as all facts relating to the individual animals prior to the *post-mortem* examinations, we must rely necessarily upon the statements of the owners who were carefully questioned concerning them.

* In addition to these, fresh preparations of blood were made and sealed, so that they could be examined microscopically before drying. It was found that white wax could be used with much success in sealing these mounts. Blood could be kept fresh for from eighteen to thirty hours by this plan.

THE ROENTGEN RAYS IN VETERINARY PRACTICE.

By Professor Hobday, M.R.C.V.S., Royal Veterinary College, London, and V. E. Johnson, M.A.

The following is a brief account of a series of experiments which were undertaken at the Royal Veterinary College, with the Roentgen rays. The apparatus used consisted of accumulators, a large induction coil, and focus tubes of various designs.

After a very careful examination of the skeleton of the horse from a skiagraphic point of view, it was decided to

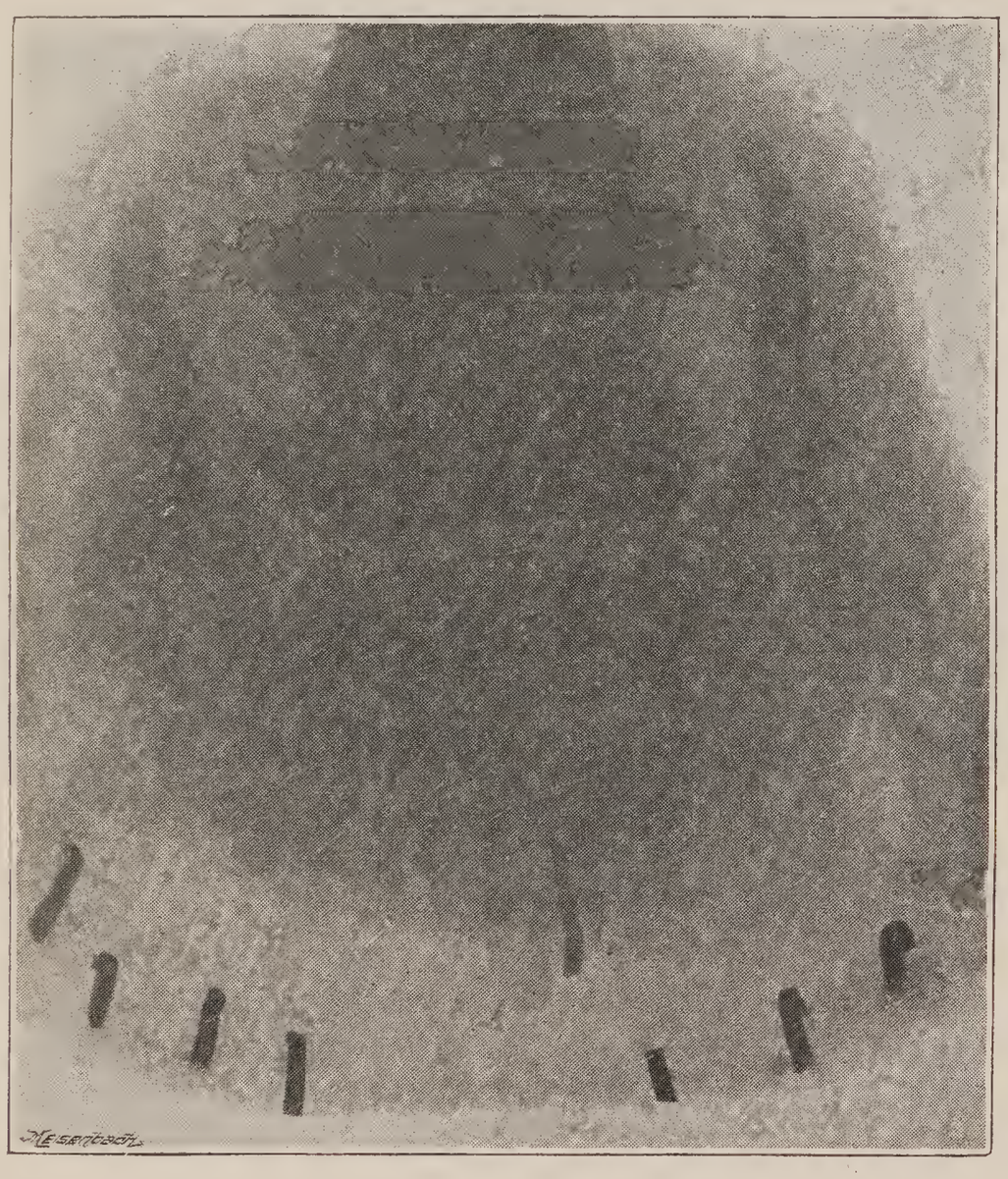


Fig. 1.—Foot showing foreign body (nail) in foot and side bones.

perform some preliminary experiments on dead subjects, as difficulties concerning penetration were anticipated, particularly with certain joints. Several fetlocks were

taken, one being in a living animal without anæsthesia, with very good results; showing clearly the metacarpus, os suffraginis, and sesamoid bones *in situ*. Two knee-joints were skiagraphed in several positions, one (Fig. 2) showing exceptionally well the knee-bones; a flexed position, with the front of the knee next to the film, and the focus-tube slightly inclined to the postero-interior part of the joint, being found to give the best result. The hoof was dealt with in several ways; it was found that the "X" rays

FIG. 2.—Normal knee.

penetrated it with facility. In one case (Fig. 1) the foot and pastern bones of a cart-horse suffering from side-bones showed these abnormalities very distinctly. As a contrast to this a healthy hoof and pastern were taken, the skiagram showing the bones clearly, the cartilages at the wings of the pedal bone appearing in shadowy outline.

In order to test its application for the discovery of a foreign metallic body in the hoof, a nail was driven in at the point of the frog, and was most definitely located in the negative. In the illustration here produced (Fig. 1) it will be seen that, owing to the shoe having been torn

off, several stumps of the nails are left in the wall of the hoof, forming a marked contrast to the remainder of the picture : the navicular bone is not visible.

The hock, with which the most difficulty was anticipated, was next attempted. Dead hocks, which were afterwards examined, and boiled in order to test the absence or presence of spavin, were first experimented with, the relative positions of the focus-tube, hock, and photographic plate

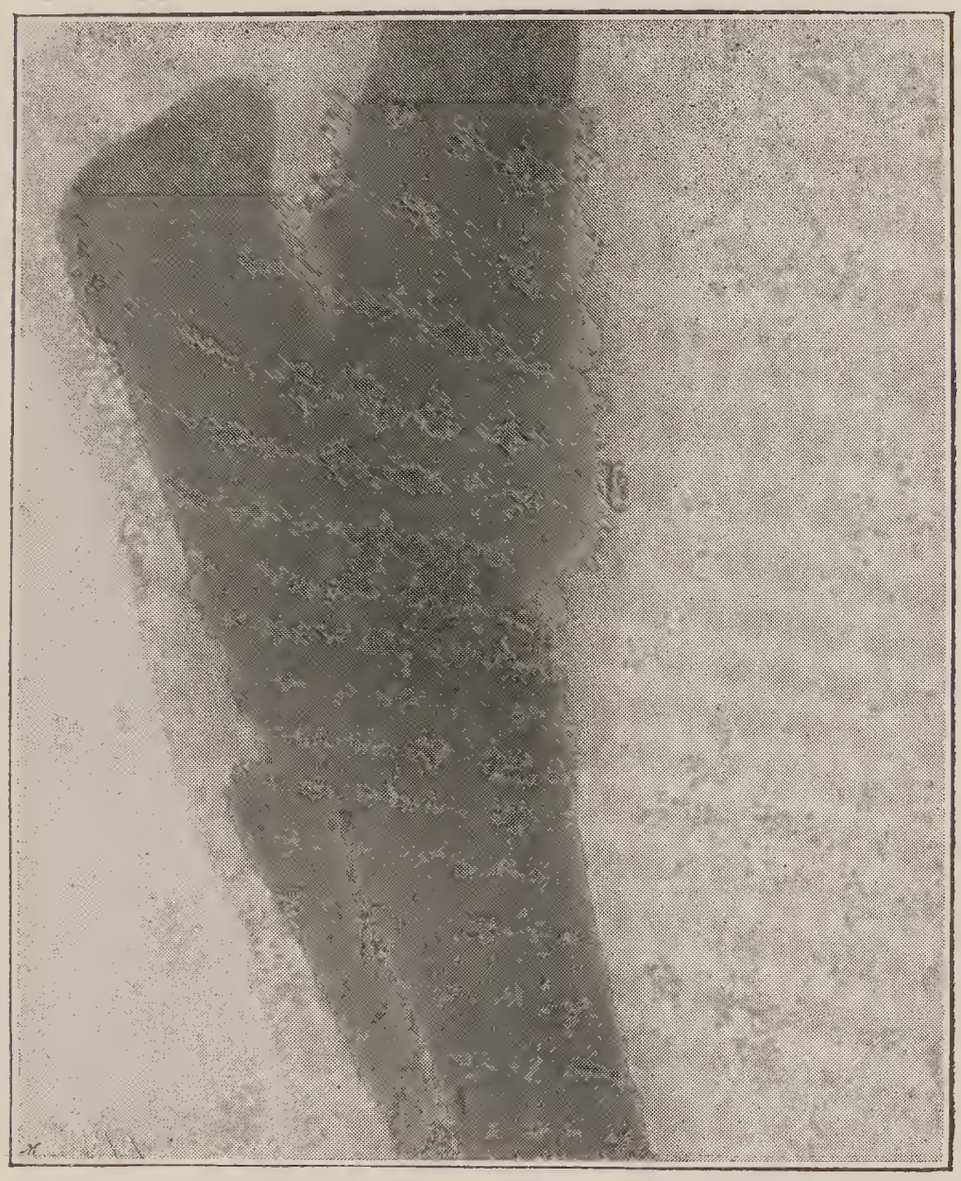


Fig. 3.—Normal hock.

being different in each case. The closeness of the bones to each other, the curved articular surfaces, and the presence of overhanging ridges so frequently found in normal hocks, in conjunction with the fact that the bones are placed one behind the other, made the task of unusual difficulty. Various exposures were given, varying from four and a half to forty-five minutes; by far the best results were, however, obtained from short exposures.

The skiagrams, though at first discouraging, improved as the attempts increased in number, and in the negative of the one here illustrated (Fig. 3) (that of the normal hock of a living pony taken without the aid of any anæsthetic) the divisions are distinctly perceptible. In another instance a needle, inserted subcutaneously in a dead subject, was, as anticipated, clearly defined.

In each of the dead hocks the bones were afterwards

Fig. 4.—Hock with spavin.

boiled and examined, the result being in every case a verification of the skiagram. In one case, a hock apparently free from spavin, no divisions between the bones could be obtained, although it was tried in every conceivable position ; when boiled, to our great satisfaction, it was found that there was an occult articular spavin firmly uniting the central portions of the cuneiforms magnum and medium.

In connection with smaller patients skiagrams were

attempted of fractures, one being that of a cat with a comminuted fracture (caused three days previously) of the metatarsals; another, a dog with a simple transverse fracture of the shaft of the femur. In the first case no anæsthetic was used, and rather less than a minute allowed as the time of exposure; in the second instance the animal was chloroformed. The results were in every way satisfactory.

With reference to the previous application of the Roentgen rays to animals undertaken by the authors of this article:

Early in March last Professor Hobday, in collaboration with Mr. Sydney Rowland, B.A., obtained several skiagrams of cats suffering from various accidents; and in June the hock and knee (the former suffering from spavin, Fig. 4) of a dead animal, together with the hock of a living donkey (anæsthetised by chloroform), were taken. Early in August Messrs. Watson and Sons kindly skiagraphed a dead normal hock for Professor Hobday. The results as regards the smaller animals were all that could be desired, and in the case of the horse gave encouragement for further research.

Mr. Johnson had successfully applied the Roentgen rays to the cat and dog; and, in connection with the horse, had obtained skiagrams of the knee-joints of two animals without anæsthesia.

In conclusion, the authors consider that the Roentgen rays can be successfully applied to the smaller animals without much difficulty. In the horse the mechanical difficulties of restraint have been successfully overcome. To penetrate easily through the thicker portion, of course, requires greater power than is at present available, or else a prolonged exposure. For diagnosis of abnormalities of the bones of the limbs, such as suspected fracture of the pastern, small ringbone, sidebone, or foreign body in the hoof, the results obtained demonstrate that this method can be applied successfully. With the bones of the neck, too, no great difficulty is anticipated. For the diagnosis of spavin, more research must be undertaken before an absolute conclusion can be arrived at; the results already obtained, however, are very encouraging.

It must not be forgotten, too, when looking at the figures here reproduced, that certain points (such as the fine divisions between the hock bones) become less marked, and that for diagnostic purposes the negative may show these quite clearly, whilst in a print they cannot be detected.

Clinical Cases.

CLINICAL NOTES.

By E. Wallis Hoare, F.R.C.V.S.

Rheumatism.

It was recently stated at a meeting of a Veterinary Society, that the existence of rheumatism in the horse was a doubtful matter. A diagnosis of this disease is frequently made in obscure cases of lameness, in order to conceal the doubt that must be present in the mind of the practitioner in such cases; but that there are genuine cases of rheumatism in equine practice we are positive, and the results of clinical experience amply justify us in this opinion. Whether the disease we term rheumatism is similar to that affection as occurring in human beings or not, does not at present concern us, as we only wish to briefly notice the clinical phenomena present in well-marked cases in equine practice. The sudden appearance of the lameness and its metastatic character are striking symptoms of the clinical history, but these are not equally marked in all cases.

Every practitioner is familiar with those obscure cases of lameness that recur at indefinite periods, first in one fore-leg, then in the other; at one time the foot seems to be the location of the lameness, at another the shoulder; in some instances a diagnosis of navicular disease is given, which time proves to be an erroneous one, as the animals ultimately go sound. There is often no distinct evidence of any enlargement or tenderness in any part of the limb, but the animals move short and in a stiff manner. Some are treated with poultices to the feet, rest, and a blister to the coronets, and go sound; others are treated for shoulder lameness, with stimulating liniments, &c., and also go sound. But to what the lameness is really due we are still in doubt, and we retain the term rheumatism as a convenient one for a working diagnosis.

Cases such as the following are by no means rare.

(1) A grey van mare, five years old, in rather poor condition, was sold to a local firm, and a guarantee for a month was given by the seller as regards soundness.

The animal worked sound for the month, and then without any apparent cause went suddenly lame in the off fore-leg, the lameness being very severe, and pointing to the shoulder as its location. A blister was applied to this region, and in about three weeks the animal went sound and was put to work. In about three weeks from this she was found one morning in the stable excessively lame in the off hind, with inability to bring the limb forwards, the muscles of the hip and stifle hard and rigid. Similar treatment was adopted, and after about two weeks she improved and went sound. In another month she went suddenly lame in the near fore, in the shoulder, and was barely able to walk. A blister was applied and she again went sound, and is working up to the present.

(2) A chestnut cob gelding, the property of an officer, was purchased recently for hunting, and was passed sound. After a month's work went lame in the near fore, at first slight stiffness when starting, which passed off after a mile or so, but next morning decidedly lame. On examination slight tenderness in the fetlock was found, and also heat around the coronet. Fomentations were applied and stimulating embrocations, while the foot was kept in a tub of hot water as long as possible. In a week's time the animal went almost sound, but suddenly developed lameness in the other fore-leg of an exactly similar character. The same treatment was adopted, and improvement occurred, but for about six weeks this animal went slightly lame, first in one fore-leg, then in the other alternately; now he goes perfectly sound. What was the nature of this case?

Such are by no means uncommon in every-day practice, and still they are a matter of vital importance with reference to the examination of horses as to soundness in its medico-legal aspects. After examination horses may develop this form of lameness suddenly and without any appreciable cause, and very diverse opinions may be obtained as to the nature of the lameness and its cause, not forgetting the length of time that it may have been in existence.

(3) A three-year-old filly was found in the field, excessively lame in the near fore-leg. On examination a hard, tense swelling was found around the fetlock-joint, very tender on pressure and showing considerable heat. This was ascribed to an injury. Fomentations and stimulating liniments were applied, but there was no improvement, and after about two weeks an enlargement appeared in

the metacarpal bone just beneath the knee, which was hard, tense, and painful. A blister was applied to the fetlock, which produced no beneficial effect. In about five weeks from the date of examination the animal was found dead in the stall one evening.

Autopsy.—Leg greatly enlarged from knee to fetlock, a large amount of fibrous tissue beneath skin. The whole metacarpal bone was covered with bony deposits, and on the inner side these had attained a large size. Both small metacarpal bones were united by osseous deposit to the cannon-bone. Examination of the heart showed an *ante-mortem* clot attached to the mitral valves, and there was extensive endocarditis in both sides of the heart; the mitral and tricuspid valves were thickened and almost black in colour.

The above case is peculiar in consequence of the paucity of symptoms evidenced during life, and the sudden death. The cannon-bone afforded a beautiful specimen when the soft tissues were removed.

Rupture and Disintegration of both Kidneys in a Foal.

Subject.—A well-bred foal.

History.—When foaled appeared perfectly healthy, and was found about eight hours afterwards unable to rise and in great pain. On attendance I found a very well-formed foal lying on its near side; the head was constantly stretched backwards as much as possible, and constantly worked in this direction. There were evidences of continuous pain, with movements of both fore and hind limbs. There was total loss of power in both hind limbs, although sensation was still present. The rectum was full of hard, dry excreta, and was completely obstructed at a short distance up; this yielded to the careful administration of enemas with the rectum tube. The bladder was empty. No tympanites present, but great tenderness evinced on pressure over the loins. Applied fomentations to loins. Prescribed a few sedative draughts and gave a dose of Ol. Ricini. Next morning no improvement; pain more acute, bowels had acted freely, great struggling at intervals, sweating profusely, visible mucous membranes deeply injected, and no secretion of urine was apparent. The animal died about twelve o'clock.

Autopsy.—Both kidneys were found softened and disintegrated, the right organ being much bruised and its

capsule ruptured. No signs of external injury were apparent.

Remarks.—I am unable to account for the conditions found in this case; nor can I state positively that external injury could have been the cause of the extensive change in the kidneys. The dam of the foal was of a very vicious disposition, and it is worthy of note that the previous year a fine healthy foal also died the day after birth with peculiar symptoms.

A Peculiar Case.

Subject.—A harness horse, aged, the property of a medical man.

History.—Doing constant harness work daily. One morning the groom, in starting to drive the horse, found that after going a few steps he suddenly "knuckled over" at the off fore-fetlock, and if driven on would fall. On examination I found that the horse could leave his stall all right, but without any warning would "knuckle over" at the fetlock, and almost bring the knee to the ground; he could then proceed a few steps further on, when the same thing would occur. He could also trot a few steps perfectly sound, and then "drop" on the leg as if suddenly struck on the nerve. No heat or tenderness could be detected in any part of the limb, but a slight fulness was present in the region of the pastern. Hot fomentations and bandages were applied, and rest ordered. Next day there was no improvement, but in about a week the animal was able to trot 20 yards without showing any symptoms, and then a similar "knuckling" would occur. A consultation was suggested, but the consultant could not come to a definite diagnosis, and ordered a severe blister to the pastern and coronet. The horse was put on grass subsequently, and came in perfectly sound.

Remarks.—The above case is one on which I should like to have the opinion of some of your experienced readers. I cannot give any further details beyond stating that the horse was a "roarer," and also exceedingly nervous. There was not the slightest trace of lameness present, and the horse did not "speedy-cut" or "brush" at any time. But the sudden "drop" on the leg should be seen rather than described in order to convey a correct impression of it. I came across a somewhat similar case at a fair last year when examining a four-year-old horse sold for £100. While having him galloped to test the wind I noticed he

"knuckled" suddenly on the near fore-leg, almost bringing the front of the fetlock to the ground; this was repeated frequently, but at intervals he would go perfectly sound. I rejected him, but saw him again in about two weeks, when he went perfectly straight in all paces. What was it?

Secondary Hæmorrhage after Castration.

The exact causation of secondary hæmorrhage after castration cannot always be determined. The method of operation has little if anything to do with it, for, as is well known, it may occur with every variety of operating and every care in the performance thereof. The constitution of the animal and the normal condition of the coats of the blood-vessels and of the blood itself are important factors to be considered. Primary hæmorrhage to a slight extent is of comparatively frequent occurrence, and is of no consequence, although it is our experience that the less blood that is lost, the better will the results of the operation prove to be. But it is that slow persistent hæmorrhage that occurs a few hours after the operation that is of great importance, for not only does its occurrence injure the reputation of the operator, but also it weakens the patient at a time when his strength should be conserved, and besides causes the formation of a large quantity of clotted blood in the inguinal and scrotal regions, which, unless carefully removed, is apt to putrefy and cause serious consequences.

The most troublesome case of this nature came under my notice last autumn, resembling to a certain extent the condition known as hæmophilia in the human subject. The animal, a two-year-old thoroughbred colt, in good condition, was castrated in the usual manner by torsion. In about two hours word was sent in that the colt was bleeding profusely. On attendance we found a steady stream of blood flowing from the near side,—not in jets, but continuously, and of a colour between that of arterial and venous. Cold water was freely applied, but without success, and the scrotum was plugged with carbolised tow and hazeline. In another hour and a half word was sent that the hæmorrhage still continued, so on attending we again plugged the scrotum, using a weak solution of Ferri Perchlor., and inserting two sutures in the scrotal wound. This had the effect of controlling the hæmorrhage, and we observed that the blood on the floor of the stall

showed little or no tendency to coagulate. Next morning the scrotal region was enormously swollen, and in attempting to remove a small amount of the tow hæmorrhage again appeared, slow and steady. Cold water was applied and checked it after a time. Next day the tow was carefully removed, but still the steady flow of blood trickled away at intervals; cold water was frequently applied. Four nights after the operation there was again free hæmorrhage, which ceased spontaneously.

The animal progressed very unfavorably, the swelling increased to a great extent, and an abscess formed in the inguinal canal, which burst spontaneously. The treatment consisted of frequent fomentations, thorough irrigation with solutions of Creolin, Potass. Chlor. being given in full doses internally, and plenty of exercise enforced. In about four weeks he was perfectly well and regained condition. Fortunately such cases are not common, but, as previously remarked, they will sometimes occur in spite of all precautions. It is surprising to observe, when we operate on a large number of colts together, the difference in the quantity of blood that appears in different individuals. In some the thighs are scarcely stained, while in others, after they rise, there is slight bleeding for a short period, others again showing quite a profuse flow, which ceases spontaneously. I am of opinion that in many instances the source of this hæmorrhage is the artery of the cord, which I have observed in some cases to be abnormally large. Dilated scrotal vessels are also to be credited with some cases of hæmorrhage. I always use a serrated scissors to sever the so-called non-vascular portion of the cord before applying the clamp to the vascular portion; this obviates the risk of hæmorrhage from the artery of the cord.

Perfect quietude after the operation is of great importance in order to give the blood-vessels a chance of becoming properly sealed, and the absence of struggling as much as possible during and after the operation is a point to be carefully observed for similar reasons.

The treatment to be adopted in cases of hæmorrhage is a subject of importance.

It is doubtful whether the hæmorrhage after this operation could be sufficient to produce fatal consequences, but its suppression becomes a matter of necessity in order to avoid the debilitating effects of the loss of a large quantity of blood.

If by any accident the hæmorrhage can be attributed to

imperfect closure of the spermatic artery, the proper surgical procedure would be to cast the animal and ligature the bleeding vessel. This may not be easily accomplished if the part has gone up the canal out of reach, and it becomes a question whether in cases of secondary hæmorrhage the best procedure is to plug the canal with an antiseptic dressing soaked in an astringent solution. This has its drawbacks in many ways, and here we may draw attention to the fact that many cases of what would appear to be serious hæmorrhage will cease spontaneously if left to themselves; of course, in a country district this is not easily accomplished to the satisfaction of the owners.

HIP-JOINT DISEASE SHOWING ON AUTOPSY THOCHANTERIC OSTEITIS, GLUTEAL MYOSITIS WITH FIBROID DEGENERATION, AND TENDINITIS WITH BURSITIS GLUTEI MEDII, THE ACTUAL CAUSE PROBABLY BEING TRAUMATISM.

By William M. Scott, M.R.C.V.S., Bridgwater.

Subject.—Early last summer I was requested to call and see a pedigree mare, five years old, with some disease of the hip-joint.

Previous History.—Quite six months, dated from the time of my being called in, she had returned from her day's work rather lame in the near hind leg. From that onwards she grew steadily worse, so that finally the owner decided upon her destruction. However, she was purchased and brought into this neighbourhood by a client of mine, who desired I should see her. I may say in passing she had been under the care of one of those "cure-all" personages, who diagnosed the case, I believe, as one of "blood-poisoning," though on what grounds I am at a loss to imagine, unless to pacify his employer's natural curiosity and screen his own ignorance.

Clinical History.—My inability to give detailed clinical notes from the commencement of the disease robs this case of a good deal of its interest. I, however, gleaned from my client the following few rough and ready details. The mare had been used the day she first showed lameness for carting out farmyard manure, and I should think it probable that she had received a blow over the region of the hip-joint with the pronged fork used by the carter in

hauling out manure—a method of stimulating progression which I have often seen employed.

Symptoms.—As noted by me when first called in: locally, over the seat of the hip-joint was a considerable swelling, which, when manipulated, gave the impression of an osseous deposit. This swelling was rendered more conspicuous by the muscular elements of the hip and thigh having undergone atrophy as a result of inaction. About eighteen inches from, and in a vertical line with the hip-joint, was a small wound about the size of a goose-quill, from which was discharging a sanguino-purulent material, and which when probed with a very fine stilette was found to lead up to the region of the diseased hip. On displacing the tail another wound of similar character was found situate about two and a half inches from the vulva, and parallel with its lower commissure. Exploration showed this wound also to have its origin in or near the joint. So much, then, for the local presentations as a means of diagnosis; but as the practitioner is often called upon to diagnose hind-leg lameness where there is no local clue to assist him in expressing an opinion, and in order to screen his ignorance finds it necessary to include the mischief under the general term "hip lameness," I think it behoves us, when we get a positive case, to make the most of it. With that view I prepared myself for future developments by taking careful notes of the patient's behaviour. There seems, moreover, such a diversity of opinion amongst our leading authorities concerning hip lameness, that it is important to take advantage of typical cases.

When at rest the animal would stand with the whole body-weight transferred to the sound leg. The diseased leg was flexed and drawn in towards the central axis of the body. At times the patient would stand with the quarters tilted over and overhanging the sound limb, so that the sound foot was directly under the centre of gravity. In such a position the foot of the affected leg was invariably found with the heel resting upon the anterior wall of the opposite leg. At other times she would be found resting the leg in a forward and inward position. When made to move, the affected leg was drawn forward in a rotatory manner, scooping the ground surface as she went with her toe, and forming on soft ground a shallow arch. In bringing the leg forward great care was shown, a short step made, and as little support brought to bear upon the affected leg as possible, which was transferred

with great rapidity to the other leg. When the step was completed the leg was found to be very much adducted. As the result of the muscular atrophy the quarter of the affected leg drooped considerably during locomotion. Great difficulty was experienced in getting the animal to turn, especially upon the affected side. When backed the foot was dragged along the ground.*

Prognosis was most unfavorable, but the owner was anxious that all should be done that was possible. The only favorable element was the comparative youthfulness of the animal and freedom from any constitutional disease. But on the whole it was thought discreet to discourage very sanguine hopes.

Treatment.—I learned that previous treatment had consisted in the administration of medicines by the mouth, and the injecting of the two local wounds. I need scarcely point out the little benefit to be derived from the latter, as no dressing could get within a considerable distance of the seat of mischief. Nothing in the shape of a stimulant had been applied to the joint, nor at the outset were any antiphlogistic measures had recourse to. Considering the severity of the case and the length of time it had been in existence, severe measures were thought necessary, and accordingly the parts were deeply fired and a mercurial blister applied. In five days' time the patient seemed to use her leg with greater freedom, the discharges from the wounds had stopped. On the tenth day she was again seen, when progress made seemed to be satisfactory. On the morning of the nineteenth day she was found down on the diseased side and unable to get up. She must have been in such a position for a good many hours. Turned over to the sound side, she got up voluntarily. The lameness now was as great as it had been at first. To condense matters, in about three weeks, dated from the time of firing, another blister was rubbed into the joint without any good results. Eventually it was considered advisable to have her destroyed.

Autopsy.—On removal of the skin the subcutaneous tissue was found to be bathed in a sero-sanguineous exudate. The biceps femoris being dissected away from its origin, and pulled downward, exposed more fully the gluteus medius. A considerable part of this muscle had become disintegrated, and, as well as the surrounding tissue, was saturated with a sero-sanguineous purulent material. The word "purulent," however, may be inapplicable here,

* Tendo-vaginitis crepitans as a symptom was totally absent.

nasmuch as when the fluid was examined microscopically very few pus corpuscles were visible; suspended in the fluid, however, were a considerable number of fatty granules. On fully exposing the tendinous insertions of

a. Fractured part of the ossific deposit. *b*. Articular surface hip-joint. The black horizontal line shows the division between the two parts of the new growth.

the middle gluteus they were found to be very much disorganised. The bursal surface of the middle slip, which plays over the convexity of the great trochanter, was covered with dense fibrous pinnacles, some of which were almost osseous in consistence. No trace of a synovial membrane was visible, and in some places tendon and bone were intimately adherent. Distinct spaces were also seen, and these were subdivided into smaller compartments by bands of partly organised (so-called) lymph constituting bursal loculi. These loculi or spaces contained material resembling coffee grounds—burso-hæmatocele.

As will be seen from the accompanying photograph, great activity had taken place in the bone-forming elements of the trochanter, which had attained considerable dimensions. I opine the primary inflammation which had taken place in the bone was of a fibrinous or productive nature, and by a process of extension the bursæ, tendon, and muscle had become implicated. The gluteal muscular elements had been largely replaced by fibrous tissue, and that too at some places seemed to be undergoing still further degenerative changes. When the femur and its ossific deposit were removed, it was found that one half of the new growth was adherent to the other half by fibrous tissue, as is shown by an approximate line drawn across the sketch. In the process of maceration this granulating tissue gave way, with consequent separation of the parts. I think it highly probable that this separation or, more properly speaking, fracture had taken place as a result of the animal getting down upon the affected leg, and struggling about for so many hours, as previously stated. Certainly the lameness was greatly exaggerated after that mishap. Although I have headed this article "hip-joint disease," it is a misnomer, for in the proper acceptation of the term the articular elements were perfectly healthy. I do so for the purpose of conveying to the reader a more localised conception as to where the disorder lay—the word "hip" itself being usually applied in a very wide sense.

REMOVAL OF A WORM FROM A MARE'S EYE.

By Reg. Wall, Docking, King's Lynn, Norfolk.

The case hereafter described will, I hope, be of interest not only because ocular operations are so rarely performed on our animals, but because of the scarcity of the worm in this position. It will, perhaps, be of more interest when it is stated to be only the second authenticated case of the kind in America, but as it is some time since the operation was performed, others of a similar nature may have been recorded. The other authenticated case was operated on by Dr. Pomeroy, of the New York American Veterinary College, in 54th Street, New York City, about twelve or thirteen years ago. The animal was chloroformed and the worm removed from the eye, but having some heart trouble the horse died under operation.

The subject of the second case was a dark bay mare,

15½ hands high. She had attracted considerable attention for several days before the operation was performed; and several enterprising American showmen had offered handsome prices for her in order to replenish their coffers from the exhibition of this "wonder," but the owner refused to part with the animal.

The parasite—I am told it was the *Filaria suli-equinus*—was three inches long, and had the general appearance of a piece of grey silk thread. It was lodged in the aqueous humour of the mare's left eye, and was first noticed about six months prior to operation, though so small as to be barely discernible. It grew steadily until it attained the stated size, and was always in motion.

The mare became emaciated until her ribs almost protruded through her somewhat rusty coat, and she was in a constant state of nervous excitement.

The operation was performed by Dr. Thomas W. Spranklin, of Baltimore, Maryland, U.S.A., assisted by Surgeon John S. Caltam. Dr. Spranklin began his operation by securing the mare on the right side. The left eye was then treated with a solution consisting of 23 per cent. rose water and 7 per cent. cocaine. Small quantities of this solution were dropped into the eye at intervals of five minutes until the cornea could be touched by the finger without the mare evincing pain. An incision was then made between the cornea and sclerotic with a small sharp lance, shaped like an arrow-head. This incision was made at right angles to the eyelid, so that the wound would be almost wholly covered by it when the eye was back in its normal position. The aqueous humour having been allowed to escape, the instrument whilst still in position was used as a guide for a pair of very delicate spring forceps which were introduced into the opening. The lance was then removed, and Dr. Spranklin, placing the index finger of his left hand upon the opposite side of the cornea, gently but steadily pushed the parasite towards the blades of the forceps. The activity of the parasite was so great that it wriggled away four or five times. At last the doctor was able to get a firm hold upon it and draw it out. Its liveliness was still maintained, and it lived for several minutes,—in fact, until it was placed in alcohol for preservation.

The lips of the incision were drawn together and closed in a flap; the aqueous humour again flowed into the cavity, and in less than three quarters of an hour the mare was back in her stall, eating as calmly and placidly as though no operation had been performed.

Dr. Spranklin gave it as his opinion that, barring inflammation, the eye would soon be as well as ever both in appearance and strength of sight, and this I believe is the case. As to how the parasite gained access to the mare's eye, the doctor conjectures that its larva was ingested with her drinking-water, and then in some way, known only to this and several other parasites which have so far baffled the researches of scientific men, reached the seat of operation.

THREE CASES FROM A PRACTITIONER'S NOTE-BOOK.

By Jno. A. W. Dollar.

Subcapsular Hæmorrhage in the Liver of the Horse; Partial Recovery; Relapse and Death.

About 8 p.m. on the 18th June, 1896, I saw a dun gelding, aged about fifteen years, the property of W. S—, which was said to be suffering from colic. The bowels had acted at 5 p.m., a small quantity of fæces having been passed, and the animal staled later. At the time of my arrival it was standing quietly, its head thrust a little forward, its face drawn, pupils dilated, legs straddled apart, muscles quivering, and its whole body bathed in cold perspiration. The mouth was cold, the conjunctiva pale, the tongue and lips were blanched and flaccid. The pulse was 94, very small and weak; temperature $100\frac{2}{5}^{\circ}$; the respirations were about 31, shallow, but not noisy, and the nostrils were dilated. Within a few minutes the animal began to walk round its box, cringing from time to time towards the right side, turning its head in the direction of the right flank, but seldom lying down. This wandering round was occasionally interrupted, the animal standing in one place, pawing violently, stretching out its head, and curling its upper lip. Vision appeared defective, for the head was several times struck against the side of the box, while the pupil scarcely reopened on the approach of a light. Raising the head caused staggering.

As the animal had been resting for ten days and had not been out of its box, and as the attack was of sudden onset, the history could throw little light on it. The suddenness of the attack, the extreme depression, dilatation of the pupil, paleness of the membranes, and general bloodlessness seemed to point to internal hæmorrhage,

while the animal's age, considered in conjunction with the known frequency of rupture of the liver in the horse, seemed to warrant the diagnosis of ruptured liver. I came to the conclusion that very little more could be done than relieve pain, and therefore gave a hypodermic injection of seven grains hydrochlorate of morphine, considering it too dangerous both for animal and attendants to attempt giving a draught.

This afforded some relief, and I waited talking with the owner for about forty minutes, during which the animal kept wandering round its box or occasionally standing still and pawing. Just as I was suggesting that death could not be long delayed it went down rather heavily, struggled a good deal, stretched out its legs stiffly, groaned deeply several times, and apparently died. In about a minute, however, to our great astonishment, it gathered itself together, rose and stood swaying about stupidly, but apparently in less pain than before. At this time the pulse was extremely frequent (I should think about 130 to 140), small and thready; the respirations about 30, but shallow and quiet. I did not take the temperature.

Owing to the danger incurred in giving medicine by the mouth I simply directed the animal to be kept perfectly quiet, to be placed on low diet, and general precautions to be adopted against its catching cold or injuring itself. In point of fact I still expected death to occur within a few hours.

On visiting the place next day, however, the patient was still alive, and distinctly better. Pulse 82, respirations 75, temperature 100°, pupil still rather dilated, surface temperature better distributed; bowels and kidneys had acted, the former slightly, and the animal had eaten a little mash. I noted the existence of slight jaundice, a fact that had been overlooked the evening before.

To avoid unnecessary details I may say that slow but steady progress was maintained until 11.30 a.m. on June 29th (*i. e.* eleven days), on which date the pulse, temperature, and respirations were, to the best of recollection, nearly normal. I did not make a special note on that day. At 3 p.m. I received a message saying the horse was dead.

Post-mortem examination revealed profuse intra-abdominal hæmorrhage, and pronounced yellow staining of all the internal organs. The foam in the bronchi was tinged yellow, the bowels were similarly tinted; the kidneys,

though otherwise normal, were of a like shade, and everywhere the abdominal fat was deeply coloured. The principal interest of the case centred in the liver, which was of enormous size, weighing over 58 lbs. Owing to the large subcapsular clots being in great part lost during removal of the liver from the abdominal cavity, this is probably a low estimate. One of these clots removed from the left lobe weighed 13 lbs. of itself, and several others existed. The liver showed excessive fatty degeneration, was yellowish to dull brown in colour, pultaceous, broke down under the slightest pressure, and permitted of the capsule being readily stripped at all points. Normal liver tissue seemed absolutely wanting. The capsule of the left lobe was separated (by hæmorrhage) over an area about nine inches square. The contained clot was firmer than the others, and appeared to be undergoing absorption. The right lobe showed perhaps less extensive change than the left, but subcapsular bleeding had occurred and the capsule had ruptured, allowing of free hæmorrhage into the abdominal cavity. The space between capsule and liver substance contained a clot weighing about 6½ lbs. Sections through the liver showed internal hæmorrhages of all ages throughout the organ; at some spots a few dark brown patches were all that remained, at others the blood was still nearly fluid. It is no exaggeration to say that it was scarcely possible to find a cubic inch without a hæmorrhage.

Viewed in light of the facts shown by *post-mortem* examination, it seems probable that the first attack, on the 18th June, was due to subcapsular hæmorrhage in the left lobe, where the clot seemed to be oldest; that under the combined influences of lowered blood-pressure in the arteries and increased local pressure at the seat of bleeding, the loss gradually ceased with the effects noted, but that on the second occasion hæmorrhage was followed by rupture of the capsule, free bleeding into the abdominal cavity, and rapid death from syncope.

Rupture of the Right Ventricle in a Horse.

On the 1st July I was informed that a brown cart gelding, the property of Messrs. E— and Co., had fallen down in work and died, and I was requested to make a *post-mortem* examination as early as possible. The history of the case subsequently obtained was as follows. The animal having recently been purchased, had only been in regular work

for a couple of weeks. On the morning of the 1st July it was despatched in a four-wheeled van, with a load of building material weighing about 25 cwt., to be delivered in Hampstead. For those unacquainted with London, I may say the approach to Hampstead from the West End entails a very severe climb. The hill was safely surmounted, and the animal drew the cart over some heavy ground towards a house in course of erection, but on being turned round and backed, in order to get into a better position, it suddenly plunged, fell on and broke the off shaft, came to the ground, gave a few convulsive struggles, and died. Some delay occurred in its removal by the slaughterers, and the *post-mortem* was not made until 8 p.m.

There was a punctured wound, produced by the broken shaft, over the ninth rib, but the chest was not penetrated. The abdominal organs appeared healthy. With the exception of well-marked hypostatic congestion on the right side, the lungs proved normal. Examination of the heart, however, showed the pericardium distended with blood, and on incising it and washing the heart itself three several ruptures of the wall of the right ventricle were discovered. The first was about $2\frac{1}{2}$ inches in length, and situated almost centrally in the wall of the ventricle. The wound itself was irregularly funnel-shaped, being large externally and tapering down to an aperture, some $\frac{3}{4}$ inch across, communicating with the interior of the ventricle. The muscular fibres were not shredded, but presented a comparatively "short" fracture, so that the wound appeared almost as if produced by a stabbing weapon. The second wound, in all material respects like the first, was 2 inches from the apex of the heart, measured approximately $\frac{3}{4}$ inch in length, and communicated with the ventricle by a mere point. The third rupture was about $\frac{1}{8}$ inch across, $\frac{1}{4}$ inch in depth, and lay $\frac{1}{2}$ inch from the apex of the heart. It did not, of course, communicate with the ventricle. Measured at their thinnest points, the thickness of the walls of the various heart cavities were as follows:—Right auricle, $\frac{5}{16}$ inch; left auricle (close to junction with ventricle), 2 inches; right ventricle, $\frac{5}{8}$ inch; left ventricle, near auricle, $2\frac{3}{8}$ inches, near apex of heart, $1\frac{1}{4}$ inches; septum, $1\frac{7}{8}$ inches.

As the horse was about 16·2 hands in height and well developed, I considered the measurements, on the right side at least, much below the normal. The muscular tissue of the heart was fairly firm, and there was no appearance of fatty change. From the history and the appearances shown at *post-mortem* I considered the train of events to have

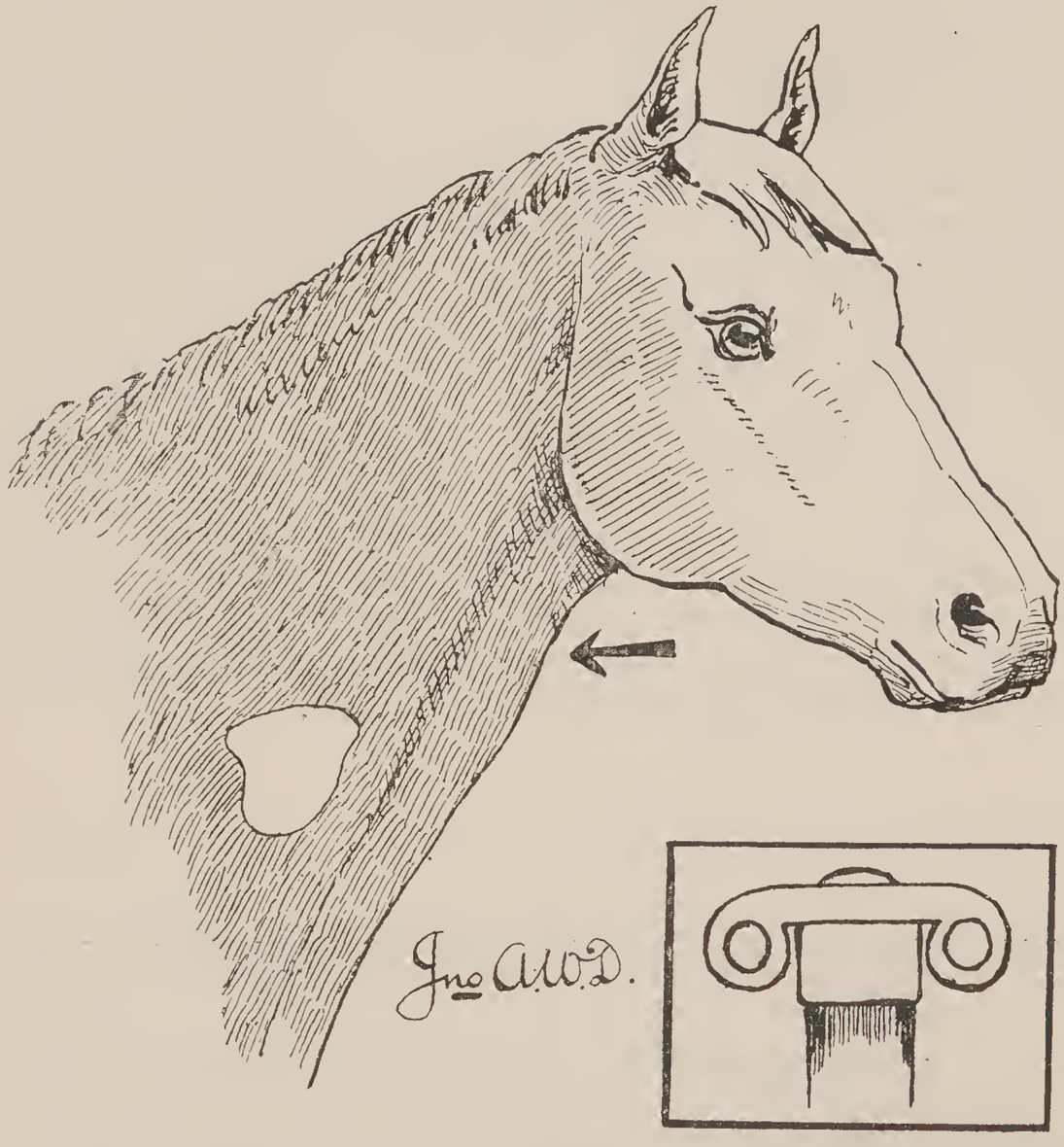
been somewhat as follows. The animal had recently been bought "in dealer's condition," *i. e.* with a great deal of superfluous fat, and a muscular system, including a heart, very imperfectly developed. The exertion of pulling a load uphill, and subsequently moving it in heavy ground, had produced excessive distension of the right heart. A momentary weakness had caused the animal to stagger and fall heavily, at which time the ruptures noted had occurred. The pericardium remaining intact, no blood entered the thoracic caxity, but death (from shock) was, of course, almost instantaneous.

Extensive Lacerated Wound in the Region of the Neck; Rupture of the Trachea; Recovery.

On the 23rd July I was requested by the Metropolitan Police to see a light van horse which, in passing the Mansion House, had been run into by a two-horse van, thrown down, and severely injured.

I found the animal suffering from three wounds—two in the neck, and one in the pectoral region. The latter was unimportant. The largest of the three wounds was on the off side of the neck, about midway between the angle of the jaw and the point of the shoulder. A large irregular fragment of skin, about $3\frac{1}{2}$ inches in either direction, had been entirely torn away, and on inserting one's finger into the aperture two channels could be detected, one about $3\frac{1}{2}$ inches in length, passing downwards and backwards, following the direction of the levator humeri muscle; the other upwards and forwards, and towards the opposite (near) side of the neck. As the finger penetrated more deeply the rough broken edges of a tracheal ring could be felt, and during inspiration and expiration air rushed in or was forced out, producing a loud bubbling sound. The tissues were extensively bruised, and the skin torn away from the subjacent structures for a considerable distance. The wound on the near side of the neck was 3 to 4 inches below the angle of the jaw, and measured some $2\frac{1}{2}$ inches by $\frac{1}{2}$ inch. It communicated with the wound of the opposite side by a channel running downwards and backwards, and by standing in front of the animal and gently passing the forefingers in from either side, they could be caused to meet just in front of the trachea. Considering how broad and blunt is the head of a two-horse van pole, it is very difficult indeed to imagine its having produced such a wound; but the statements of two eye-witnesses leave no

doubt that it was by the pole the injury was inflicted. The want of a fixed point on the near side, between which the parts could have been crushed, also seems a difficulty, because, without such point, it appears almost incredible that a broad blunt body could have produced a *double* wound. The explanation I feel inclined to favour is as follows :—The driver of the single horse saw the pair-horse van approaching, and drew up his horse almost on his haunches. Under these circumstances the shafts would be



The larger wound is shown white; the position of the smaller is indicated by the arrow; the pole head is shown within lines.

thrust forward, and if the breeching were slack the near shaft might easily come opposite the spot on the near side where the second wound occurs. If the pole then struck the horse on his off side the trachea and muscles would be nipped between it (the pole) on the off side and the shaft on the near side, the trachea might well be ruptured, and the wounds found produced.

Owing to the extensive bruising, and the important

vessels and nerves and other structures likely to be implicated (jugular, carotid, vagus, trachea, œsophagus, &c.), the prognosis was very guarded, and the owners were warned of the possibility of septicæmia afterwards setting in.

The wound was thoroughly explored and cleansed, care being taken to avoid the use of much fluid, which would have passed into the trachea. No stitches were inserted, as the freest possible drainage was aimed at. The treatment adopted was the injection three times a day of small quantities of a 5 per cent. "Sanitas" solution, care being taken to reach the bottom of all the wounds, the thorough cleansing of the neighbourhood of the wound, and the use of low diet. On July 24th the wound and surrounding parts were greatly swollen, but the discharge was not offensive; and although for the next four or five days swelling was troublesome, and at one time gave rise to some anxiety, it then began to subside. There was slight fever and a rather high pulse-rate for the first few days, but this disappeared, and the horse continued feeding throughout. At the time of writing, 8th August, *i. e.* sixteen days after the accident, both wounds are closed, granulation is free, and there is every probability that in another week the horse may return to work. Whether or not stenosis of the trachea may occur and breathing be impeded cannot at present be determined.

THE VETERINARIAN, SEPTEMBER 1, 1896.

THE DEARTH OF CLINICAL ARTICLES.

The dearth of Clinical articles is a perennial subject of remark, and—we may add—complaint, with all editors of veterinary periodicals at this season. As the editor of an esteemed contemporary once feelingly remarked, "the editor cannot write *all* the journal." The words, though used satirically, suggest little more than fact. So preoccupied and apathetic is the profession, that of the three thousand members composing it, scarce three hundred, we should fancy, ever put pen to paper to assist one of their professional organs. The journals hardly deserve this neglect. With every respect for the susceptibilities of our literary

compeers we venture to affirm that the business of publishing a veterinary periodical can scarcely be regarded as highly lucrative. We have heard of crossing-sweepers possessed of substantial balances at the bank, and mendicants owning blocks of houses, but of a millionaire veterinary editor—never. This being so, it is doubly incumbent on members of the profession to contribute what they can to sustain enterprises carried on solely in their interest. In our own case we offer a small honorarium for articles contributed; not with the idea that the value of such can be assessed in pounds sterling, but because photographs, specimens, railway carriage, &c., have all to be paid for, and we do not expect our colleagues to be out of pocket in assisting us. We well know the difficulties of literary work in a large practice, for the present writer may claim to be engaged in a very large one; but we also know that however busy a man may be, he can always find the "way" if he only have the "will," and we do plead for a little help from those to interesting whom we voluntarily devote a large share of what might otherwise be leisure.

We do not ask for polished articles. Let any who have interesting cases make careful notes of facts, let them send us a photograph of anything novel in connection with the case if they can, and care will be taken that the information sent is usefully employed.

MOTOR CARS.

Without an undue tendency to that melancholy frame of mind suggested in the Scotch saying about "supping sorrow wi' a lang spune," we yet cannot regard without some apprehension the repeal of existing legislation by the "Locomotives on Highways Act" just passed. Those who practise in towns have, within recent years, seen so marked a change in the character of their *clientèle*, and have with regret noted the inroads made firstly by the decay in the landed interest, and afterwards by the introduction of tricycles and bicycles, that any further step threatening to displace the horse as a motive power necessarily gives food for the most anxious thought. It must be remembered that since the extension of better roads the horse as a draught animal has survived, less on account of his innate good qualities, than of the severe protective measures passed half a century ago, and that whilst in the early forties, when locomotive engineering

was in its infancy, steam traction on turnpike roads had already made such progress that omnibuses were regularly running between the more important towns in the Midlands, enormous progress has since been registered, and dozens of firms are, and hundreds soon will be, turning out road carriages of ever-increasing perfection. At the present time two large exhibitions of "horseless vehicles" are being held, one at the Crystal Palace and one at the Imperial Institute, and every one visiting them must confess his amazement at the excellence of the machines shown. It is true some emit an unpleasant smell, that others vibrate considerably, and that a few drop cinders as they go; but these are details. At least one produces no vibration, smoke, smell, nor noise, while it easily travels up to sixteen or eighteen miles an hour, and appears under perfect control both on the straight and round corners. This will doubtless soon be followed by others equally perfect. A petroleum-driven motor is exhibited, which only occupies about two cubic feet of space, weighs under 100 lbs., and yet produces two indicated horse-power. Applied to bicycles, it is capable of realising a speed of thirty-five miles an hour and upwards, carrying two persons. And this is only the beginning. The manufacturing firms have hundreds of orders, and people are paying double price or more to obtain early delivery. A large new motor omnibus company has been formed, and one at least of the existing companies is considering the desirability of adopting mechanical traction. We are sincerely anxious to avoid a pessimistic view, but the philosophy of the ostrich has no attractions for us, and there is no use in shutting one's eyes to facts.

OUR FUTURE.

Darwin is said to have traced the sterility of red clover to the absence of old maids, somewhat in the following fashion: old maids keep cats, cats eat field mice, field mice destroy humble-bees, humble-bees carry pollen, and thus impregnate clover; ergo, when old maids are absent clover is sterile. The explanation is rather far-fetched, but there really seems some reason for connecting the want of prosperity in our profession with excessive shipbuilding and unrestricted free trade. Though the fact is not generally recognised, agriculture still represents the most important of our industries; and as the country client is almost always a farmer, whilst the best of town clients formerly depended

on land for their income, anything depressing agriculture is evidently to our hurt. Now we submit (though with some trepidation, for the subject is a thorny one) that the chief reasons for agricultural depression are those above quoted. Since 1875, *i. e.* twenty years ago, the registered tonnage of the British merchant service has doubled, freight has fallen to an alarming degree, while imports of wheat (a fairly true index of the British farmer's prosperity) have risen in sympathy, and new wheat-exporting countries are almost yearly coming into existence. In 1875 the average price of wheat in the United Kingdom was 45/1 per bushel, in 1894 (the last year of which we have statistics) it was 22/10, or 50 per cent. less. Nor does the real gravity of the question at once strike one. If at the present moment, with wheat say at 23/-, the farmer makes a profit of 1/- per bushel—an excessive estimate—his income from that source has fallen, not 50 per cent., but over 95 per cent.; *i. e.* where he previously made twenty-three shillings clear profit he now only makes one shilling. Accordingly great areas have been laid down to grass, with the result of dispensing with thousands of working horses, steam power has been introduced for ploughing, &c., and the farmer has turned to cattle and horse breeding, sheep-farming, dairying, fruit-growing, and the cultivation of more or less speculative crops. Everywhere, however, he finds foreign competition—rendered possible by low freights and the absence of import duties—heading him off. Live stock and meat, horses, butter, poultry, eggs, fresh fruit, hops, &c. &c., are poured into the market from every quarter of the globe at ever-decreasing prices, and if he still retains the market for high-bred stock it is one of few now left him. Naturally he cannot afford to pay heavy fees; or, indeed, to employ a veterinary surgeon. Turning to the manufacturing industrial firms, we find matters are little better. Ten years of trade depression and keen competition have resulted in rigorous economies, in contracts for veterinary attendance, yielding the practitioner a bare subsistence, and in fees which, once lowered, *never rise again*. The third source of income, represented by the landed classes, is in even worse plight; and as horses are a luxury, and an expensive luxury at that, they are the first things to go when the impoverished gentry begin to set their house in order. It may be said we have omitted the care of animals other than the horse. So far as cattle and sheep are concerned many practitioners already declare they scarcely repay

attention, and that the veterinary surgeon's services are only sought as a last resort. Canine practice is at present remunerative, but has a very restricted sphere, while we know of no practitioner who has hitherto made a speciality of bird disorders. It must be remembered that in our profession there are no great prizes such as exist in the medical, while the monetary value of an animal is almost invariably a limit beyond which fees cannot extend.

All the facts suggest that, if not yet on the ebb, the tide in our affairs is at least turning, and that to avoid disaster we must miss no opportunity of employing all our present, and enlarging our future, spheres of action.

THE GROWTH OF THE REGISTER.

In the preceding note we have glanced at some of the reasons for low fees and restricted practice. A potent cause remains, viz. the natural increase in our numbers. The first of the annual Registers was issued in 1875. It contains the names of 2141 practitioners. In twenty-one years it has grown from a little pamphlet of fifty leaves to an important tome of 330 pages, while its name roll has increased to 3179. A comparison of the two Registers is interesting, and might well be commended to all intending aspirants for our diploma. To enable the readers of the *Veterinarian* to judge for themselves of the degree of increase, we append statistics of a few counties.

Name of County.	Number of Resident Practitioners in 1875.	Number of Resident Practitioners in 1896.
Middlesex	138	241
Devon	29	57
Gloucester	20	37
Lancashire	121	202
Brecknock	3	6
Carmarthen	3	9
Cardigan	1	6
Flintshire	1	5
Glamorgan	6	21
Merioneth	1	4
Argyle	1	7
Ayr	10	36
Kinross	0	2
Linlithgow	2	6
Wigtown	4	20

The increases in Wigtown (five times) and Cardigan (six times) are probably the best marked of any in the kingdom, but there are many counties not noted above where the number has doubled or trebled.

THE NATIONAL VETERINARY MEDICAL ASSOCIATION.

The recent meeting of the above Society revives the question, "Why is the National so ill-patronised?" After fourteen years of existence it has failed to secure the adhesion of 10 per cent. of the enrolled members of the R.C.V.S. We believe the reasons are many. Firstly, an existence composed of two days' feverish activity and twelve months' slumber cannot be healthy, and so closely resembles death as to be practically indistinguishable from it. Secondly, an organisation permitting a select few to hold all permanent offices cannot be popular. Thirdly, the method of existing on the hospitality of "Provisional Committees," who are annually thrown overboard and replaced by a fresh list, cannot secure permanent adherents. We know that a few years back one or more persons were placed on the "Provisional Committee," and their names printed, before they had become *or even been asked to become* members of the Society. Such action is very undesirable, and recruits must indeed be badly wanted to justify it. We do not know what the "Provisional Committees" do except contribute handsomely to the funds and organise entertainments. They certainly never seem to be allowed any hand in the management of the Association. Another abuse is that of allowing officers and permanent committees to be elected *en bloc*. At the annual meeting a gentleman rises and gabbles off a list of names; another gentleman seconds, and before anyone has time to draw a third breath the officers for the year are elected. That is a bad system. Year by year the same persons remain in power, and although distant members may not openly protest they show their disapproval by seceding. Of recent efforts to infuse new vigour into the Society the affiliation scheme seems the least desirable, affording, as it does, unparalleled opportunities for converting the organisation into a great political engine before which no isolated society could stand. It would afford a basis for a gigantic political union, which would certainly fall into the hands of some veterinary John Burns or Ben Tillett, with disastrous results. Lastly, we should like to suggest the need of a little more variety in the selection of essayists and those who open discussions, for while recognising the great value of the services rendered by those filling these responsible positions, we regard the method hitherto adopted as a source of weakness. The table below shows the names of those officiating for twelve years; 1883 and 1887 are unavoidably omitted.

Year.	*Essayist.*	*Opener of Discussion.*
1884	Professor McCall.	Professor Walley.
	Professor Williams.	Mr. T. H. Simcocks.
1885	Professor Walley.	Mr. R. Rutherford.
	Sir F. Fitzwygram.	Professor Axe.
1886	Mr. J. S. Hurndall.	Mr. T. Hopkin.
	Professor McFadyean.	Mr. R. Rutherford.
	Mr. W. Hunting.	Mr. H. Hunter.
	Professor W. O. Williams.	... .
	Mr. R. Roberts.	Mr. Simpson.
1888	Mr. A. Robinson.	Professor Penberthy.
	Professor F. Smith.	Mr. W. Hunter.
	Mr. E. Faulkner.	Mr. W. Hunting.
1889	Mr. H. Macgillivray.	Mr. H. Olver.
	Professor Edgar.	Professor Walley.
	Mr. W. Hunting.	Mr. Sheather.
1890	Mr. Banham.	Professor McCall.
1891	Professor McFadyean.	Mr. G. Fleming.
	Professor Penberthy.	Mr. McGavin.
	Professor Williams.	Mr. W. Hunting.
1892	Mr. W. Hunting.	Professor Macqueen.
	Professor Dewar.	Mr. Thompson.
1893	Professor McFadyean.	Mr. W. Hunting.
	Mr. Wallis Hoare.	Professor F. Smith.
1894	Mr. Jno. A. W. Dollar.	Vet. Captain R. Butler.
	Professor Penberthy.	Professor Edgar.
1895	Mr. H. Olver.	Professor McFadyean.
	Professor Macqueen.	Professor Dewar.
1896	Professor McFadyean.	Mr. C. Stephenson.
	Mr. N. Almond.	Mr. W. Hunting.

The disproportionate representation of the teaching element is very noticeable. The practitioner comes in at the tail end, and contributes his mite to the discussion with bated breath and whispering humbleness. Analysing the table, we find that Mr. W. Hunting, formerly a teacher also, has read three principal papers and opened four discussions, Professor McFadyean has read four principal papers and opened one discussion, Professor McCall is responsible for one paper and one discussion, Professor Williams for two papers, Professor Penberthy one paper and one discussion, Professor Walley one paper and two discussions, Professor Edgar one paper and one discussion, Professor Macqueen one paper and one discussion, Professor Dewar one paper and one discussion, Professor Smith one paper and one discussion, &c.; and each of these gentlemen has in addition *contributed freely to debates opened by others.* We do not suggest any reason for all this, but we do think that if the Association is to become more popular the practitioner should be better represented at its meetings and discussions.

Jno. A. W. D.

The Month's Progress.

Formation and Structure of Dental Enamel.—Dr. J. L. Williams (*Proceedings Roy. Soc., Lond.*) summarises the special points of the results of his research in something like the following terms:—He has discovered the existence of a very thin membrane, or a structure of a membrane-like appearance, lying between the ameloblasts and the forming enamel. Enamel is formed by deposit, and not by cell-calcification; this deposit probably consists of two distinct cell-products. The varicosities of the enamel rods are not caused by acids, but represent a true structural peculiarity of this tissue. The varicosities correspond with the course of one set of fibres, and may therefore be caused by their presence.—*Journ. Roy. Micr. Soc.*

Ascaris megalocephala as Cause of Death.—Herr Römer (in *Deutsche Thierärztl. Wochenschr.*, 1896) narrates two cases in which *Ascaris megalocephala* was the cause of death of horses. An old horse died of peritonitis from perforation of the small intestine by *A. megalocephala*. In a two-year-old filly the irritation produced by the presence of the parasites was so severe that there was not only prolapse but rupture of the gut, the animal dying from hæmorrhage into the abdominal cavity.—*Ibid.*

Bothriocephalus Zschokkei, sp. n.—Herr O. Fuhrmann (*Centralbl. f. Bakteriol. u. Parasitenk.*) describes a new species of tapeworm, *Bothriocephalus Zschokkei*, of which two specimens were obtained from the intestinal canal of *Ardea stellaris*, a fish-eating bird. The lengths of the strobiles were 25 and 30 mm., and the breadth of the segments near the middle of the worm 2·5 mm. A singular characteristic of this species is that in the anterior half the proglottides are broader than in the posterior half. The scolex is triangular. In the text two bothria are described, but in the illustration the sucker is represented as horseshoe-shaped. The number of joints is about eighty. The muscular system is strongly developed, and presents some striking peculiarities, five layers being described. The water-vascular system is well developed, and the number of anastomoses numerous. The nervous system consists of two thick longitudinal bundles, which in the scolex unite at a ganglion. The sexual openings

lie on the ventral surface. The ova are 0·07 mm. long, and 0·029 mm. broad.—*Ibid.*

Cysticerci in a Dog's Heart.—Dr. W. Lindemann (*Centralbl. f. Bakt. u. Parasit.*) found twenty to twenty-five vesicles, each the size of a hazel-nut, filled with clear fluid, in the muscle of a dog's heart. From the inside of each bladder grew a swelling the size of a hemp-seed. This was found to be a tapeworm scolex, provided with a double circle of hooklets and four suckers. On the whole these worms seem to resemble *Cysticercus cellulosæ*. After alluding to the rarity of the occurrence of the hydatid form of tapeworm in dogs, the author goes on to suggest that the reason of this is to be sought in a special immunity.

Glycogen in Fungi.—According to M. G. Clautrian, glycogen is in fungi the most important equivalent of the starch of ordinary plants. Like animal glycogen, that obtained from fungi is dextrogyrous; diastatic ferments convert it into a sugar, probably maltose, which reduces Fehling's solution; dilute acids convert it, when heated, into glucose. The iodide has usually a red-brown colour. The glycogen of fungi contains a rather large amount of ash, but no nitrogen. A process of obtaining glycogen from fungi (Basidiomycetes and Saccharomycetes) is described in detail. The proportion in the dried powder varies between 14 and 31 per cent.

Zebra and Horse Hybrids.—Our readers will remember several contributions by our friend Professor Ewart, F.R.S., of the University of Edinburgh, on Telegony, and it is well known that at great expense he is carrying out experiments from which we hope some good results will accrue and valuable information be derived. The following from the *Field* will be read with interest:—"On August 12th the interest of Professor Ewart's experimental stud at Penicuik (Midlothian) was greatly increased by the arrival of a hybrid between a male Burchell's zebra (*Equus Burchelli*) and a mare (*Equus caballus*). Though the mare (Mulatto—a descendant of the half-wild Island of Rum ponies—lent for the experiments by Lord Arthur Cecil) is jet-black, the foal, except over the hind quarters, has as many bands as its zebra parent. The bands are fawn-coloured, the background nearly black. But though the hybrid, by its stripes, suggests the zebra, in form it closely resembles an extremely well-bred foal. Should Mulatto next summer have a foal to Professor Ewart's

Arab horse, Benazrek, provided with stripes and other zebra-like features, an important step will have been made in justifying breeders in believing in telegony, or, as it is familiarly called, "the infection of the germ." Lord Morton succeeded in crossing a male quagga and a nearly purely bred Arab mare, but it does not appear that a mare has hitherto been crossed with a male Burchell's zebra—a very different matter from breeding with a zebra mare and a horse. When the present hybrid colt and the hybrids expected next summer reach maturity, it will be alike interesting and important to ascertain whether they are fertile with each other, and with pure horses, zebras, and asses. It may be added that Professor Burdon Sanderson, Mr. Alexander, R.S.A., the distinguished animal painter, and others who have seen the hybrid, were agreeably surprised with its grace and beauty. It suggests an impressionist picture, in warm colours, of a wild zebra.

Long Fast of a Terrier.—Cases are on record of prolonged fasts through which domestic animals have gone. Many will have heard of the pig which was buried for many days by a fall of rock from Shakespeare's Cliff at Dover. Last year Professor Dewar wrote in this journal of sheep buried in the snow; and in the issue of the *Field* for August 15th, Mr. W. L. Littleton-Geach informs us of a terrier's long fast. This is what he says: "A friend of mine has a cross-bred terrier bitch which accompanied him to the beach one day. She went hunting rabbits on the cliffs, and got into some old mine workings. All trace of her was then lost until a few days ago, when, after thirty-six days' absence, she was found on the beach quite a living skeleton, and begrimed with mud and earth. Possibly she may have had a rabbit to eat, but I naturally regard hers as a record case. She is now recovering her health and spirits."

A Precocious Puppy.—In the same issue of the *Field* occurs the following over the initials "W. D.:"—"About four months since we had a mongrel bitch puppy given us, about the size of an ordinary fox terrier, and she is seven months old at the present time. Two months since we had a male kitten given us about five weeks old, which its mother had deserted. About a week after having had it we noticed that the puppy was full of milk, and could not understand it, until one day we caught the kitten lying down and sucking the bitch puppy, which the latter evidently thoroughly appreciated. The kitten continued to

do so until two days since, when it showed signs of sickness through poisoning, and died this morning. I may add that the puppy was extremely fond of the kitten, and is showing signs of intense grief."

Encephalitis due to a Cerebral Myxoma.—PERRUSSEL, in *Progrès Vétérinaire,* mentions the case of a cow, to which he was called, that showed the following symptoms. She suddenly became depressed, made rolling movements towards the night, with head drooping and eyes half closed. In the byre she appeared sleepy and had rigors; the rectal temperature was 41° C. As the result of energetic treatment, which included bloodletting, the application of mustard, cold douches to the head, hypodermic injections of aconitine, veratrine, and pilocarpine, there was a fleeting improvement. Forty-eight hours later the animal died. On *post-mortem,* at the base of the brain there was found an ovoid tumour, whitish, the size of a nut, which examination revealed to be a myxoma. There was also softening of the brain, the vessels of the meninges were injected, and the pia mater and choroid plexuses were congested.—*Recueil de Méd. Vét.*

The Use of Ammonia in Tympanites of the Rumen.—Ammonia is commonly prescribed for the relief of tympany, with the view of neutralising the carbonic acid and so forming an ammonium carbonate, which is also used as an antitympanitic. It is pointed out, however, that carbonate of ammonia itself decomposes into ammonia and carbonic acid, and thus the last state becomes as bad as the first. Such is the opinion of Queyron, expressed in the *Progrès Vétérinaire,* and he suggests the use of weak alcohol along with an antiseptic. The following is recommended:

Alcohol (40 per cent.) . . .	½ litre.*
Water	1 litre.
Cresyl or lysol	20 grammes.

In a later number of the same journal Mousnier, who agrees with the views of Queyron, suggests the use of the following:

Vegetable charcoal, Sea salt, Calcined magnesia . . .	āā 2 tablespoonfuls.
Powdered chalk . . .	1 tablespoonful.
White wine . . .	1 litre.

Dilute alcohol may be used instead of white wine.

Recueil de Méd. Vét.

* 1 litre = 35 fl. oz.
1 gramme = 15·4325 grains.

Greyhounds and the Period of Gestation.—N. Dunn, writing to the *Field* of August 15th, says, "Noticing a reference to the late whelping of a greyhound bitch of Sir Thomas Brocklebank, Bart., and thinking my own experiences may interest you, I send a list copied from my books, which I have kept for the last thirty years. You will see there are eighteen days between the shortest time (fifty-three days) and the longest (seventy-one days). Altogether there were 185 bitches at an average of 63·281 days, with an average per litter of 6·70 whelps. One bitch whelped in 53 days, three in 55, two in 56, one in 57, one in 58, five in 59, twelve in 60, twenty in 61, fifteen in 62, and fifty-two in the usual 63 days; while there were twenty-three in 64 days, ten in 65, fifteen in 66, seven in 67, ten in 68, three in 69, two in 70, and three in 71 days.

Oidium albicans as a Pathogenic Agent.—M. Charrin (*Semaine Méd.*) found *Oidium albicans* in a submaxillary abscess. Experiments on animals showed this organism did not thrive in the liver until the glycogen was converted, hence it was only found in the larger hepatic vessels. The kidneys were crammed with it, and there co-existed acute nephritis, with almost complete suppression of urine. Both serum and urine showed toxic properties, but these were very slight, so that the pathological action of this organism is probably mechanical.—*Journ. Roy. Mic. Soc.*

Malignant Œdema in a Cow.—Owing to failure to inoculate malignant œdema in cattle, bacteriologists hold that these animals are immune to this disease, while veterinary surgeons have often observed instances of this disorder. Herr H. Horn (*Norwegische Veterinar-Zeitschr.*) records four cases of malignant œdema in cows from which *Bacillus œdematis maligni* was isolated, and demonstrated by inoculation. All the four instances occurred after calving; in three there was puerperal metritis, and in the fourth a hæmorrhagic œdema and swelling of the neck.—*Ibid.*

Science Notes.

The Decimal System is now coming so largely into use that a few words in explanation of its origin may not prove amiss. Our national system might fairly have been described as duodecimal, having for its base 12 instead of 10. Twelve has six divisors: 1, 2, 3, 4, 6, and 12; while 10 has only four: 1, 2, 5, and 10. The duodecimal system therefore appears to have great advantages. What, then, is the reason of the extension of the decimal system? An article in the *Bibliographie générale de l'Astronomie* goes far towards answering the question. With two or three exceptions, all the Indian races of America, the islanders of Australasia, and the negro tribes of Africa count by tens, or at least by fives. The generality of this fact points to a common cause, which is certainly not to be found in any agreement or convention between such widely separated peoples, but is probably attributable to some natural factor. We count by 5 or by 10, says Aristotle, in the 'Problemata,' because at first all counting is done on the fingers. It is, in fact, the natural way. For the same reason, the expressions for "five" and "hand" are in certain languages identical, while the expression for ten is "two hands." Some peoples, amongst whom are the Esquimaux of Greenland, who count up to 20 without recommencing, and who might be regarded as using a numeration having for its basis 20, count first on the fingers and then on the toes. This, therefore, is the origin of the numeration which we might call the "natural system." As nations have advanced they have adhered to the same method, which even the Chinese employ side by side with their binary system (having 2 as its basis). The Greeks had a series of special characters for the units, another for the tens, a third for the hundreds, and so on: their written, like their spoken numeration was therefore decimal.

The Intra-venous Injection of Normal Salt Solution (**·7 per cent.**) has been tried in the treatment of infectious diseases. The disease was produced by injecting *Bacillus coli-comm.*, and the experimenters, MM. Bosc and Vedel, gave special attention to the best method of using the salt solution and the physiological effects produced. Dogs inoculated with *B. coli-comm.* die in two or three hours

when the dose is large (3 c.c. per kilo. of body-weight), in ten to fifteen hours when it is moderate (1 c.c. per kilo.), and in twelve to forty hours when it is small (1 c.c. to ·35 c.c. per kilo.).

The experimenters find that copious intra-venous saline injections modify the evolution of the disease in a varying manner, according to the amount of the culture and of the solution injected, and to the interval between the respective injections. The solution acts (1) by favouring the elimination of the poisons, thanks to the osmotic action of the sodium chloride, and to its directly exciting the renal epithelium, thus causing diuresis, and indirectly elevating blood-pressure by reflex action; (2) by hardening the degenerated red blood-corpuscles; (3) by favouring intra-cellular nutrition; (4) by diminishing the destructive action of the tainted (pathological) serum on the blood corpuscles. The "retarding action" exercised by early injection of salt solution leads the authors to consider that such solutions may induce a condition of exalted "curative activity" (*suractivité curatrice*); thus they have seen an injection produce, in healthy dogs, a general reaction, which in the case of disease is exaggerated to such a degree as to resemble the natural reaction seen at the crisis of a fever. This retarding or attenuating action may, in part at least, be due to the immediate vaso-constriction which replaces the enormous vaso-dilatation produced by inoculation with *B. coli-comm.*

A New Fertiliser has just been introduced into Germany under the name of "Nitragine." Some years ago Hellriegel and Wilfurth made the very important discovery that atmospheric nitrogen was seized on and assimilated by certain bacteria to be found on the rootlets of leguminous plants, and that where such bacteria were absent from the soil these plants either grew very badly or not at all. Further experiments on the sterilisation of the soil and its fertilisation by bacteria followed, and all appeared to point in the same direction. The indications were not neglected, and a German chemical manufactory is now turning out the new fertiliser "Nitragine," which consists simply of cultures of the bacteria necessary for the growth of these plants. As the same species of bacteria do not succeed equally well with every leguminous plant, pure cultivations of each have been made. These cultures are sold in quantities sufficient for several

acres at very moderate prices, and on each flask are directions for use, and an indication for which crop the particular culture is intended.

Does the Rabbit perspire ? is a question apparently decided in the negative by the experiments of Luchsinger, which were generally accepted. M. Lecercle, however, has recently proved that if in that animal cutaneous perspiration is very slight, it nevertheless occurs. His method is to shave the hind quarters and cover them with a glass bell, the interior of which soon shows a heavy deposit of dew. When pilocarpine is given, one of two results may be produced: either there is abundant salivation and very little increase in cutaneous transpiration, or salivation is slight and transpiration markedly increased; but in any case the dose required to produce therapeutical effects is much greater in the rabbit than in most other animals, weight for weight.

Vaso-dilator and Secretory Fibres for the Mucous Membrane of the Larynx have recently been demonstrated by M. E. Hédon in the superior laryngeal nerve. M. Hédon found that the excitation of the peripheral stump of the superior laryngeal produced reddening of the laryngeal mucous membrane, and increased secretion in the small mucus glands on the same side. He considers that the superior laryngeal should be regarded as a vaso-dilator and secretory nerve for the laryngeal mucous membrane, just in the same way as the *chorda tympani* is for the submaxillary gland. The vaso-dilatation and secretion thus produced are apparently due to direct and not to reflex action, as they also occur after section of the recurrents and of the vago-sympathetic nerves. M. Hédon says excitation of the peripheral stump produces no appreciable results.

The Immunity of the Hedgehog against Viper Bites has recently occupied the attention of Messrs. Physalix and G. Bertrand. The hedgehog being, as is well known, an active enemy and destroyer of the viper, it seems plausible to assume that he possesses some protection against the bite of his dangerous victim. Some persons suggest that this consists in seizing his prey very rapidly, and then curling himself up, exposing only his spiny armour, until such time as the viper has expended its poison, when he unrolls and devours it. Others maintain, however, that he enjoys a real immunity against the poison. Milne-Edwards and Vaillant have shown that the hedgehog is

proof against viper bites, even about the face and snout. The Abbé Chabiraud, who furnished the authors with a great number of live vipers, made a similar communication. He placed a young hedgehog and three vipers in a box; the hedgehog was bitten about the muzzle and close to the eye, and although the bites were deep enough to draw blood he did not seem to have suffered, and the wounds soon cicatrised. The supporters of the first view may possibly object that the poison had perhaps not penetrated the wounds, or that the vipers used had no poison in their glands. One sometimes finds vipers, in fact, with little or no poison left, so the authors took up the question systematically. They state that although the hedgehog avoids the attacks of the viper with a great deal of agility, yet he does not fear them. He has, indeed, so marked an immunity that he can survive several severe bites. His resistance, compared with that of the guinea-pig, is (weight for weight) from thirty-five to forty times as great. In order to kill a hedgehog of 445 grammes body-weight in twelve hours, it was found necessary to inject subcutaneously twenty milligrammes of dried venom. But, as shown by repeated examinations, it is rare to find as much as this even in both glands of an average viper, and further the reptile never ejects all his venom at one stroke. Amongst the various hypotheses which occur to one when seeking to explain this is that of the presence in the hedgehog's blood of a substance capable of neutralising the venom. Were this the fact, one should be able to inoculate the guinea-pig, for example, with a mixture of venom and hedgehog's blood without producing fatal results. But there is an initial difficulty in the way of the test. The hedgehog's blood is itself toxic for the guinea-pig. Doses of 2 to 3 c.c. injected into the guinea-pig's abdomen produce death in fifteen to twenty hours. The same is true of the serum, though in a less degree. In consequence it has been necessary to use doses of less than 2 c.c. of the serum. But notwithstanding the number and variety of these attempts the authors were never able to produce an apparent immunity. They accordingly sought to destroy the toxic substances in the serum without injuring those conferring immunity, and succeeded by heating the defibrinated blood or serum to 58° C. for a quarter of an hour. This destroys the toxic material, but leaves the immunising property uninjured. A guinea-pig inoculated in the abdomen with 8 c.c. of this serum resists inoculation in the thigh with double the

mortal dose of venom. It retains all its brightness, and only in occasional cases does its temperature fall for a short time to the extent of a degree. The protection, however, is of short duration, and disappears in some hours. These experiments are very precise, and tend to show that the natural immunity of the hedgehog against viper poison is due to the presence in the blood of an immunising substance. The authors cannot at present say whether this substance more resembles an antitoxin or a vaccine, or whether it partakes of the nature of both. The protective action increases for forty-eight hours, and then passes off. It does not appear that this protective material is special to the hedgehog, but rather that the animal shows in a high degree what many others manifest in a less measure. Possibly by employing the mongoose one might obtain a serum of sufficient activity to be of therapeutic value.

The Toxicity of the Flesh in Poisoned Animals.—M. G. Lewin has communicated to the Berlin Society of Medicine the results of his experiments on the poisonous properties of flesh from animals poisoned with strychnine. A fowl received three grains of strychnine, and a dog was afterwards fed with its flesh. After 225 grammes the dog became ill; after a second portion it was seized with tetanic convulsions, and rapidly died. M. Lewin states that certain animals are less susceptible than others to selected poisons; thus the fowl is comparatively refractory to strychnine, the goat to hemlock, the partridge to arsenic, and the rabbit to nicotine. But although such animals may have suffered no inconvenience themselves, their flesh might quite well be dangerous to man.

Inoculations against Pleuro-pneumonia by the methods respectively of Arloing and of Willems have been made at Pouilly-le-Fort. Forty animals were used, thirteen being inoculated at intervals of fifteen days with a liquid produced by the culture of Arloing's *Pneumobacillus liquefaciens*; another thirteen were inoculated with serosity from a pleuro-pneumonia lung prepared by Willems' method; fourteen were retained as test animals. When the twenty-six inoculated animals were pronounced proof against the disease they were, together with the fourteen test cases, allowed to remain in contact with three cows affected with pleuro-pneumonia for more than a month. On slaughter the results were as follows:—Control animals, 10 diseased, 4 healthy; per cent. diseased 71·42. Arloing's

method, 9 diseased, 4 healthy; per cent. diseased 69·23. Willems' method, diseased 0. This appears to very strongly support Willems' claims, and to show that the International Veterinary Congress at Berne in 1895 was over-hasty in condemning his method. JNO. A. W. D.

Current Topics.

ROYAL COLLEGE OF VETERINARY SURGEONS.

THE EXAMINATIONS IN LONDON.

WE much regret that owing to the late date at which we received the official report below, it could not be inserted in our August issue.

The Written Examination was held on Friday, July 10th, at the Examination Hall of the Incorporated Law Society, Chancery Lane, W.C.; the Oral Examinations at meetings of the Board of Examiners on and between July 21st and 25th inclusive at 10, Red Lion Square, and the Royal Veterinary College.

The following students passed their *Final Examination*, and were admitted members of the Royal College of Veterinary Surgeons:

Messrs. W. C. Prudames, R. P. Thomas, A. E. Payne, P. J. Hagmaier, E. B. Bartlett, J. S. Pike, C. H. Spurgeon, J. H. Burnet, F. T. Barton, W. J. Browning, H. B. Eve, R. Gilby, P. S. Howard, F. G. Siddle, A. Maynard, W. C. Stanley, F. T. Treevin, T. A. Verney, W. Wordley, C. E. Wells.

The following students passed their *Third Examination* (under the four years course):

Messrs. S. T. Amos, J. B. Collier, P. M. Evershed, H. Gillard, F. Harber, A. J. Hines, *R. W. Hall, W. H. Hirst, G. H. Kitchen, P. Lloyd, A. Miller, F. Crowhurst, A. Olver, C. E. Perry, W. G. Taylor, *J. F. Thurston, F. J. Walder, *S. B. Woolatt, B. E. Wooster, R. B. Wood.

The following students passed their *Second Examination*:

Messrs. S. G. Chellew, R. S. Collihole, J. F. Jewell, *C. W. Abrams, O. L. Fisher, H. Gamble, E. Peacey, †C. Radway, P. W. Smith, T. J. Symes, C. M. Sharpe, *P. J. Simpson, †E. E. Batt, D. Crole, *A. H. Corry, D. Chalmers, W. Cranston, †T. Wolsey, *A. Whicher, *W. R. Williams, *H. A. Woodruff.

Marked thus * passed with Second Class Honours.
„ „ † „ „ First Class Honours.

The following students passed their *First Examination :*
Messrs. †H. G. Allen, *A. N. Brodee, *H. Burrell, F. W. Cousens, *C. H. Coombe, J. Cane, C. R. Copp, T. Haigh, H. H. Jeffries, G. T. Jackson, B. L. Lake, †W. Lawson, *G. Lockwood, J. Lee, *J. C. Mumby, W. R. Neale; A. L. Purdy, C. E. Rix, *C. Roberts, D. H. Rail, *E. L. Siddall, *J. M. Tate, *J. J. B. Tapley, †G. H. Woodridge.

ARTHUR W. HILL,
Secretary.

* Marked thus* passed with Second Class Honours.
† ,, ,, † ,, ,, First Class Honours.

A DANGER OF CLOVER.

THE intestinal calculi and hair-balls of horses and cattle are well known, but Mr. F. V. Coville, of the U.S. Department of Agriculture, has recently called attention to a new source of trouble in the hairs of the calyx of the crimson clover, *Trifolium incarnatum.* Up to the time of flowering these hairs are soft and flexible, but they afterwards become stiff and almost needle-like in character. If hay made from over-ripe clover is fed to cattle, these hairs, which are barbed, form balls of a tough, felt-like consistency three or four inches in diameter, which ultimately cause death through peritonitis or some related ailment. The first deaths from this cause in the United States were noted in 1895, and farmers are cautioned against allowing this clover to become too ripe before making it into hay.

The tops of the spineless cactus, *Anhalonium Lewini*, of Southern Texas, which contain an active poison, serve as articles of trade among the Indians, who use them as an intoxicant or stimulant during their dances or religious ceremonies. Mr. Coville considers that, in the absence of spines, this bitter, poisonous property serves as a protection against animal enemies.—*Natural Science.*

SIR F. FITZWYGRAM'S VETERINARY PRIZES, 1896.

ROYAL COLLEGE OF VETERINARY SURGEONS;
10, RED LION SQUARE, W.C.

SIX competitors entered for these prizes. The *viva voce* examination took place at the Royal Horse Infirmary, Woolwich, on 4th August, and three candidates were

selected for the further written examination on the following day at Red Lion Square.

The following are marks obtained by the above three candidates :—

Full marks, *vivâ voce* examination 2080 } 3130
„ „ *written* „ 1050 }

	Vivâ voce.	*Written.*	*Total.*
1st Prize, £50—			
F. A. Verney, Royal Vet. Col., .	1935	990	2925
2nd Prize, £30—			
W. J. Browning, Royal Vet. Col. .	1680	805	2485
S. E. Morton, Dick College .	1390	728	2118

(Having failed to obtain 60 per cent. marks in two subjects is disqualified for a Prize. The donor has awarded him £10)

The examiners were Veterinary Captain Blenkinsop and Mr. Sidney Villar.

ARTHUR W. HILL, *Hon. Sec.*

Army Veterinary Department.

ROYAL WARRANT.

RETIRED PAY—ARMY VETERINARY DEPARTMENT.

VICTORIA R.I.

WHEREAS it has been represented to Us that the rates of retired pay hitherto granted to officers of Our Army Veterinary Department are insufficient;

OUR WILL AND PLEASURE IS that the following shall be substituted for Articles 585 and 588 of Our Warrant for the Pay, Appointment, Promotion, and Retired Pay of Our Army, dated the 11th March, 1896 :—

585. SCALE OF RETIRED PAY.

Officers under the rank of Director-General retiring under Article 583—

Voluntary Retirement.

	Yearly.
Veterinary Lieutenant-Colonel—	
After 20 years' service*	£250
„ 25 „	350
„ 30 „	420
Veterinary Major or Veterinary Captain—	
After 20 years' service*	200
„ 25 „	300

Officers retiring under Article 584.—A gratuity of £800.

588. Scale of Retired Pay.

Officers retiring under Article 586.

Director-General, Army Veterinary Department . . . . . £600 a year.

Retirement for Age or Medical Unfitness.

Veterinary Lieutenant-Colonel—

After 20 years' service*	. .	£320 a year.
,, 25 ,,	. .	400 ,,
,, 30 ,,	. .	420 ,,

Veterinary Major or Veterinary Captain—

After 10 years' service*	. .	8*s.* 6*d.* a day.
,, 15 ,,	. .	10*s.* 6*d.* ,,
,, 20 ,,	. .	£250 a year.
,, 25 ,,	. .	350 ,,

Officers retiring under Article 587.

After 10 years' service.—A gratuity of £800.

After 30 years' service.*—Retired pay at the rate fixed by Article 585 for the officer's rank when retiring voluntarily after 30 years' service.

It is our further Will and Pleasure that this Our Warrant shall take effect from the 1st day of January, 1896.

Given at Our Court at Windsor, this 6th day of July, 1896, in the 60th year of Our Reign.

By Her Majesty's Command,

LANSDOWNE.

Veterinary Captain D. J. Barry proceeded to Aldershot from Preston on the 25th inst. with the 6th Dragoons.

Veterinary Captain R. Moore and Veterinary Lieutenant W. M. Millar accompanied the 9th Lancers from Aldershot to the Royal Albert Dock on the 26th inst., for embarkation to South Africa in the steamships "Malta" and "Simla."

Extract from 'London Gazette,' dated August 25th, 1896.

Veterinary Captain J. D. Edwards, 1st Life Guards, to be Veterinary Major; dated 26th August, 1896.

Contagious Diseases in Animals in Great Britain.

Swine Fever.—For the past few weeks according to the returns published in the *London Gazette* this disease has been decreasing as compared with last year. In the eight weeks ended August 22nd there were 686 fresh outbreaks

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as compared with 891 in the corresponding period of last year, a decrease of about 25 a week. The number of pigs slaughtered as being diseased or having been exposed to the risk of infection have been in the eight weeks this year 10,928, whereas last year there were 9894 slaughtered.

Anthrax.—This disease has been rather more prevalent this year than last. In the eight weeks there have been 61 fresh outbreaks in which 124 animals were attacked; last year the figures were 52 outbreaks and 123 animals attacked.

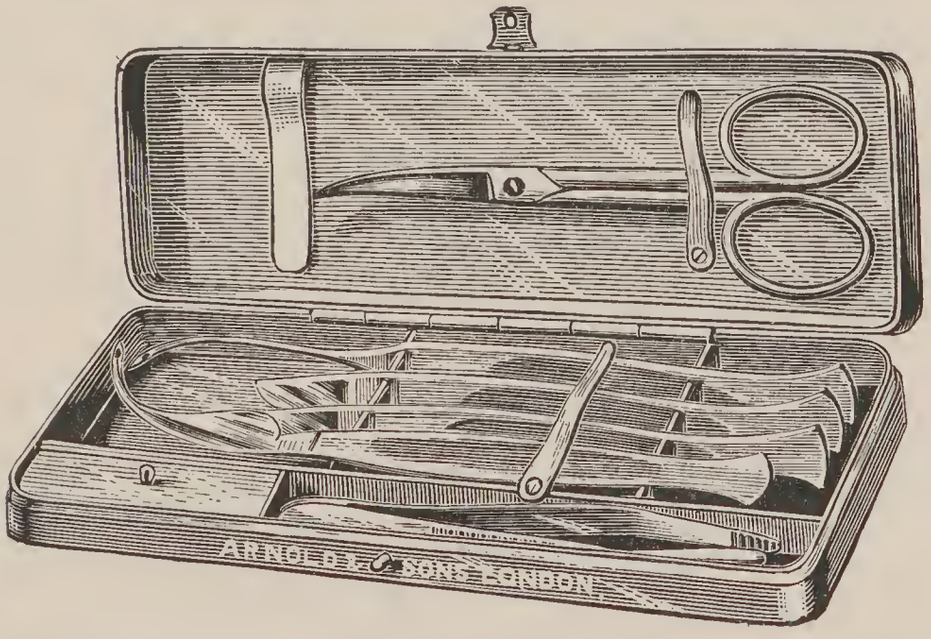
Glanders.—It would appear from the *Gazette* returns that this disease is on the decrease. In the eight weeks this year there have been 132 outbreaks and 195 horses attacked. In the corresponding period of last year the figures were 186 and 286 respectively.

Rabies.—This is also on the decrease. In the eight weeks this year there have been 50 cases, all of them in dogs, whereas last year in the same time there were 91, viz. 74 in dogs and 17 in other animals.

New Apparatus, &c.

A NEW ASEPTIC NEURECTOMY CASE.

By Henry Gray, M.R.C.V.S.



Messrs. Arnold and Sons, of West Smithfield, ever ready to advance the interests of the profession in their department, have made at my suggestion a case of aseptic neurectomy instruments which will, I think, prove a convenience to practitioners.

The case is nickel plated and is quite air-tight, and the rack can easily be removed. It contains the following instruments.

A small pair of curved sharp-pointed scissors, two neurectomy knives, one with a blunt convex back and sharp straight cutting edge, the other a short scalpel, a sharp-pointed neurectomy needle, a bistoury for dividing the nerve, having at one end a blunt neurectomy needle, and a pair of aseptic spring forceps. There is also a special compartment for suture needles and a spring for holding wire. The instruments have all steel handles, the forceps and scissors being disarticulated in order to allow of being cleaned.

Notices to Correspondents.

To ensure the publication of communications in the coming number they should arrive by the 15th of the month.

Will Contributors kindly note that, for illustrative purposes, the following are the best processes in order of merit?—Good Indian ink line-drawings, on stout white paper or cardboard, crayon drawings, photographs with good contrasts of light and shade, bold sketches in sepia. Sketches in lead pencil are very difficult to reproduce, and are not satisfactory.

The drawing should be considerably larger than the subsequent illustration is to appear; the reduction fines the lines and greatly improves the appearance.

Letters, Articles, Reports of Cases and of Veterinary Meetings, should be addressed to The Editor, 'Veterinarian,' Royal (Dick) Veterinary College, Clyde Street, Edinburgh.

The Editor does not hold himself responsible for the sentiments expressed by contributors, nor can he undertake to return rejected papers. He will be happy to advise and assist as far as possible, by letter, correspondents who may desire information regarding cases, instruments, or books.

Back Numbers.—To economise space it has become imperatively necessary to reduce the stock of back numbers of the *Veterinarian*. Will readers therefore note that Messrs. Adlard can at present supply most of the back numbers from March, 1887, onwards at published price, but that early application is necesary, as certain of these numbers are now out of print, and the stock of all is strictly limited.

JOURNALS, MAGAZINES, NEWSPAPERS, ETC., RECEIVED.

Recueil de Médecine Vétérinaire. Annales de Médecine Vétérinaire. Revue Vétérinaire. La Clinica Veterinaria. Berliner Thierärztliche Wochenschrift. Zeitschrift für Veterinärkunde. Agricultural Journal (Cape Colony). *Live Stock Journal. The Veterinary Record. The Veterinary Journal. The Lancet. The British Medical Journal. The Field. Pellerin's Median Neurotomy,* by Linntard; *Circulars* 9, 12, and 13; *Cornstalk Disease and Rabies in Cattle, and Tapeworms in Poultry,* from U.S. Department of Agriculture.

Letters and communications have been received from Messrs. R. Wall, Wallis Hoare, F.R.C.V.S., W. Scott, M.R.C.V.S., A. Hodder, H. K. T. Tasker, A. J. Williams, &c.

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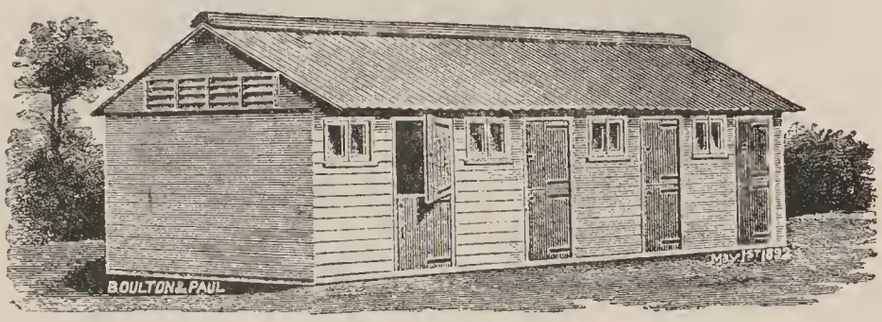

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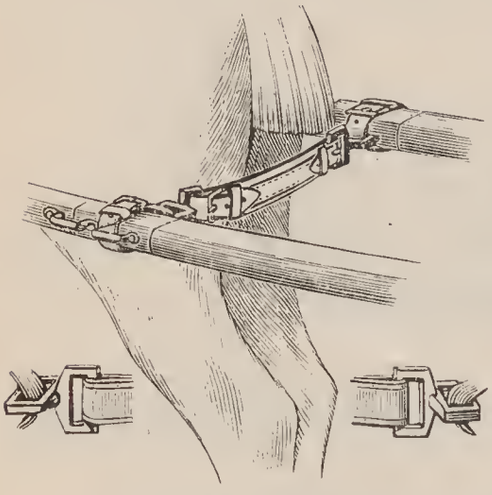

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THE VETERINARIAN.

REPORTS OF SOCIETIES.

AUGUST, 1896.

YORKSHIRE VETERINARY MEDICAL ASSOCIATION.

The summer quarterly meeting was held at the Queen's Hotel, Leeds, on July 31st, 1896. Mr. J. Clarkson, Garforth, president, in the chair. The following members were present: Messrs. J. E. Scriven, Tadcaster, hon. treasurer; A. McCarmick, Leeds; Philip Deighton, Selby and Riccall; Gavin Scott, Scarbro' F. W. S. Clough, Morley; Sam Chambers, Kirkheaton; S. Wharam, Leeds; J. Cooke, Scarboro'; A. W. Mason, Leeds; A. W. Briggs, Halifax; J. Atcherley, Harrogate; G. Whitehead, Batley: H. Snarry, York. The visitors were: Messrs. C. Radway, A. J. Lane, E. Murray, Malton; E. Child (vet. student), H. Dyson, Huddersfield.

The Secretary (Mr. Frank Somers) announced receipt of letters from gentlemen regretting their inability to be present, including Profs. Williams, W. O. Williams, Pritchard and Penberthy, and Messrs. G. W. Carter, Keighley; and J. Abson, Sheffield.

Election and Nomination of Members.

On the motion of Mr. Somers, and seconded by the President, Mr. H. Newsome, of Thornbury, was elected a member.

Mr. C. Drabble, of Bradford, was nominated for membership by Mr. Somers.

A Recent Criticism of the Profession.

Mr. Somers said that in accordance with the wish of the last meeting he had written to Mr. T. Myers, butcher, of Leeds, with reference to a criticism of the profession on the occasion of a deputation from the National Federation of Meat Trades to the President of the Local Government Board (Mr. Chaplin) on the subject of tuberculosis. According to a report that was published in *The Yorkshire Post* of the interview Mr. Myer's was alleged to have said that "he heard that veterinary surgeons told cowkeepers when their beasts were attacked with tuberculosis to fatten them up and send them to

the market, and the butcher who bought them had to bear the loss." Mr. Myers had replied, "In answer to yours of this morning I beg to contradict most emphatically that I made any such statement as you mention. I have not seen the *Yorkshire Post* report, therefore I could not know anything about it. I think you know me better than to think I could make any such foolish statement, confessing as I do that veterinarians cannot always tell when the disease may be in its first stage."

Mr. Briggs thought that Mr. Myers himself ought to make known his denial through the same channel as the report was published. He accordingly moved: "That, in the opinion of this meeting, after duly considering the text of Mr. Myer's reply to the challenge issued to him at the instance of this Association in April last, and seeing that his attention was directed to the publication of the alleged statement in *The Yorkshire Post*, Mr. Myer's ought, in all fairness to the veterinary profession, to have given an emphatic denial to the statement through the medium of the same journal. This Association is also anxious to draw the attention of the readers of *The Yorkshire Post* to the fact that Mr. Myers was not the President of the National Federation of Meat Traders as reported in the said issue of *The Yorkshire Post*."

Mr. A. W. Mason seconded, and the resolution was unanimously agreed to.

The Serving on Juries.

The circular letter of the Southern Counties V.M.A. was read.

The President emphasised the importance of the two matters mentioned in the communication. They ought certainly, in his opinion, to try to get the liability of serving upon juries to be removed. He invited the opinion of the members on the subject. As to the question of fees that was a matter which touched them very closely and he need not say very much about it.

Mr. J. Cooke pointed out that the question of serving on juries had been discussed on various occasions by different societies and in the professional periodicals. If the opinion of the profession were obtained he thought it would be found that the majority of them were in favour of an Act of Parliament being passed to exempt them from serving upon juries. He thought they had a justifiable reason in asking for a Bill with that object in view.

Mr. Mason observed that it had been the endeavour of the Council, and it was their wish now if possible, to get an Act of Parliament exempting veterinary surgeons from being called upon to serve as jurors. One of their presidents had made inquiries of a Government Department, and was advised not to press the point, because it would not be acceded to them. That, however, was no reason why they, as a profession, should not keep on agitating. The more they agitated the more support

they were likely to get, and it was possible that they might get in the thin edge of the wedge.

Mr. Somers moved a resolution supporting the action of the Southern Counties Association.

Mr. J. E. Scriven seconded, and the resolution was adopted without dissent.

The Late Mr. J. M. Axe.

Mr. Mason moved a vote of condolence with the family of the late Mr. J. M. Axe, of Doncaster, to whose worth he testified both professionally and socially.

The resolution was seconded by the President, supported by Mr. Cooke, and agreed to in silence.

Rupture of Rectum. By Mr. P. Deighton.

A ten year old Shire mare in good condition, and which had previously had two or three foals. On the 2nd of June she was served by a very vigorous Shire horse and directly afterwards was put into the cart shafts to lead manure. The owner was obliged to take her out, as she began to show pain, making small pieces of dung, etc. She was taken home and given a colic draught; she continued to show a little pain all the afternoon. I was called in to see her at night, and found the pulse up and breathing slightly accelerated, gave her an anodyne and left. Next day found things much worse; the defecation going on very frequently and in small pieces, and continual straining. I examined per rectum which I found empty for about 10 inches. Then I found a mass of dung and after removing it found a rupture in the rectum, about 14 inches from the anus. From this day, June 3rd, the dung had to be removed by the hand or injections. The mare gradually got worse day by day, smelt bad, and strained occasionally; no appetite, refused food from the first day. I called in my friend Mr. Scriven on 10th June. The mare eventually died on the 12th June, ten days after copulation. The mare was removed 5 miles in a cart. I found about 2 yds. of the small intestines had come through the rupture in the rectum. The post-mortem revealed extensive peritonitis and a rupture in the rectum 6 inches in length. There was no communication with vagina or uterus. Now as there is possibly some law to follow I refrain from mentioning what I think was the cause of the rupture, and hope that some of the gentlemen present will help me in the matter.

A discussion *in camera* took place, as the matter was still *sub judice*, among those speaking being Mr. Scriven, Mr. Briggs, and Mr. S. Wharam.

Radiographing and Chloroforming Small Animals.

By Mr. Cooke.

The subject of his first remarks was a rough-haired cross-bred dog, which fell over a cliff and fractured the hind limb on two separate occasions in two separate places. Considering that radiography was all the rage he thought it would be interesting to the members if he got a specimen of the animal radiographed. He took the dog to an exhibition at Scarborough and had it radiographed by Professor Coard. He believed it was the first canine subject that had been radiographed. The fracture of the femur was shown, but unfortunately the second fracture which occurred below the hock he was unable to get. He had no doubt that radiography would be of great use to them in the diagnosis of diseases when it became more perfected. This animal was put under chloroform. It took him 10 minutes to get under the influence and he was kept under the influence 35 minutes.

Mr. Cooke read some notes taken by Professor Coard. Afterwards he exhibited some chloroforming and securing appliances which, he explained, were brought out by Professor Hobday. He found the hobbles very useful for securing animals for surgical operations and for chloroforming purposes, because there was no restriction on the respiratory movements. Up to the time of trying this cap he had entirely given up the use of chloroform in canine practice, as he found by the old method of procedure death was the rule rather than the exception, with diseased dogs especially. The dogs he had placed under anæsthesia by this means were not diseased. He had not had an opportunity of using it largely as he had only had it in his possession about three weeks. With regard to chloroform itself he thought the pure was decidedly preferable, as a smaller quantity was required and the cost was not greater than methylated. There was less liability to death, and especially in horses there was a saving in time. With pure chloroform he produced anæsthesia in a horse in less than ten minutes, whereas with methylated chloroform he found 7 or 8 minutes more was required. He had made a few rough notes of animals placed under chloroform by means of this apparatus.

The first subject, which was a rough fox terrier, aged 10 month, was tried without preventing the admission of air to the cap. Half an ounce of pure chloroform was placed in the bottle and for 20 minutes he tried to get the animal under its influence without effect. Another half an ounce added produced the effect in five minutes. The dog was kept under the influence for 15 minutes.

A black French poodle, aged 8 months. The bottle was nearly filled with methylated chloroform. The anæsthesia was produced in six minutes. The hand in this case was placed over the nozzle partly occluding the

air. He tried for 25 minutes to destroy the animal without effect.

A cat, age 18 months, and slightly mangey. One ounce of chloroform was placed in a bottle and anæsthesia was produced in three minutes. The hand was placed over the nozzle, partly preventing the admission of air, and for 25 minutes he tried to destroy the animal without effect.

A rough-haired terrier, age 2½ years. The bottle was nearly filled with methylated chloroform and anæsthesia was produced in 10 minutes. The hand was placed over the nozzle partly occluding the air. He also tried for 25 minutes to destroy this animal without effect.

The next subject was one for radiography. It was a very rough-haired cross-bred dog, aged 2 years and 3 months. The bottle was filled with pure chloroform and anæsthesia was produced in 10 minutes. The hand was placed loosely over the nozzle. This took place in a warm close room. The dog was kept under the influence altogether about 35 minutes.

He also experimented upon a rough fox terrier bitch, pregnant, aged one year. An ounce of chloroform was used and it was 8 minutes going under the influence, and for surgical purposes it was kept under the influence of chloroform for 10 minutes.

Tuberculosis of the Spleen in the Horse.

Mr. Cooke said his notes were casually made at the time that he saw the animal in question. Standard authors gave no diagnostic symptoms. Professor Williams in his work on Veterinary Medicine said that there were no diagnostic symptoms by which this disease could be recognised during life—the only symptom that he gave being pallidity of the mucous membrane—and that two cases had been reported where the symptoms shown was a tendency to rush back when the head was touched. He (Mr. Cooke) had had two cases under his notice with symptoms so similar that he thought when taken collectively there would be no difficulty in diagnosing this disease. To show that when the symptom was taken individually mistakes might occur, he might say that the former case was under the notice of four veterinary surgeons before his advice was asked. One considered the brain affected, another spinal injury, and two some chronic form of indigestion. The first case was reported in *The Veterinary Journal* in 1890. The symptoms were so similar in the two cases that his description of the fresh case would suffice.

A brown coaching filly, aged three years, belonging to Mr. Bishop, of Haburn Wike, near Scarboro'. From the history he gleaned that the animal was unwell last autumn, and it was thought to be toothache or some disease of the teeth. The position of the animal was so characteristic of the former case of tuberculosis that he had under his charge that he was led to ask the question

whether it had ever been stabled with cows, as in the former case, the animal was stabled for nearly two years with cows. He ascertained that the animal when stabled had never been in any other place but a cowshed ; also that two years ago several cows were shot which were described to him as piners, evidently pointing to tuberculosis. This might be a coincidence but it was worth noting. He found no fault with the excretions. The appearance was generally unthrifty, slightly roached back ; difficulty in getting head down, the animal being unable to eat any food from the floor ; pining of the muscles, especially of the neck, back of shoulders, and front of chest ; stiffness of gait and turning ; when turned round sharply a slight grunt was emitted. When the nose or mouth was touched the animal rushed back, and somewhat resembled a horse suffering from a mild form of tetanus. It lay a great deal, with limbs stretched out, and placed the head on the knees. When standing the head was occasionally resting on the manger or any other substance. In rising from the ground the animal uses the hind limbs first, in a similar way to the cow. The visible mucous membrane was pallid ; frequent pulse 55 ; temperature 101 ; appetite fairly good.

Diagnosis—tuberculosis of the spleen. Prognosis—death. He recommended slaughter. The owner, having spare grazing, turned it out to grass off the bank sides, as it was unable to grass in the usual way owing to its not being able to get its head down. A message was left on the 20th of July to say that the animal was doing no good and that it could be shot for his inspection at any time. He again visited the animal on the 27th July, with the object of photography. He was then told that the animal did not lie so much, but when going into that position she walked round in a circle, dog-fashion, before dropping. She was now grazing on the banks sides and did not seem so sensitive about the nose, that was to say, she was not inclined to rush back so much. The pulse was 65 ; temperature 101. It was his intention to try the tuberculin test, but he had not the opportunity. As to the post-mortem, all the internal organs were pale and flabby. Parts of the spleen, pancreas, and lungs were forwarded to Professor McFadyean for examination microscopically, and he kindly and promptly reported that the lesion in the spleen was tuberculosis. Singularly this spleen only weighed 1lb. 14½oz., whereas the weight of the spleen in the other case which came under his notice was 16lbs. Mr. Cooke exhibited six photographs showing the characteristic positions of the animal during life. He also showed part of the spleen.

The President remarked upon the importance of having discussions upon matters such as those now laid before them, and personally thanked Mr. Cooke.

Mr. Somers congratulated Mr. Cooke upon his up-to-date remarks. With reference to tuberculosis of the

spleen he mentioned that some time ago he had a case where the animal wasted away and absolutely refused food of any kind.

Mr. Briggs : Was tuberculosis confined to the spleen? Was the liver free.

Mr. Cooke : Yes.

Mr. Briggs, alluding to the chloroforming of small animals, inquired if any member had intentionally destroyed dogs by chloroforming them.

Mr. Mason said he had tried to destroy dogs in that way but could not, and had gone back to the use of prussic acid.

Mr. Somers remarked that he had never tried to kill them by using chloroform, because the administering of prussic acid was a much easier method.

Mr. Briggs mentioned that he had a client who had insisted that he should chloroform a horse before shooting it.

Mr. Lane said he had a small terrier to destroy and thinking that pure chloroform would kill the animal he gave it an ounce. The chloroform did not seem to do the dog any harm and he gave it some more, but it recovered.

The President gave his experience of administering chloroform to three dogs. The first case, which was at College, was a failure, but in the other two instances the dogs were certainly chloroformed to death.

Mr. Cooke was surprised at the remarks of Mr. Mason and Mr. Briggs. At first he thought they were joking, but afterwards concluded that they were serious. Both dogs and cats were susceptible to death under the chloroform when administered in the ordinary way. He had had animals die like flies. In regard to putting small animals to death he never adopted any other means than chloroform in dogs and cats taken to his place. He reckoned from two to two and a half and three minutes quite sufficient. He put the animal to be destroyed in a box and put about 1½oz. of chloroform on the sponge. He found that death resulted in two or three minutes without any recognisable pain.

Mr. Briggs said that a few years ago the Nizam of Hyderabad appointed a commission, upon which several eminent Englishmen sat, to decide whether chloroform was a dangerous drug to use as an anæsthetic. The result of their inquiry was that they could not poison an animal by chloroforming except in certain cases.

Mr. Scriven (to Mr. Cooke) : Do you put the animal in a box and exclude the air?

Mr. Cooke : A certain amount of ventilation is given for the first minute, then the box is closed.

Mr. Briggs : But that is suffocation.

Mr. Wharam said his experience was the same as that of Mr. Mason and Mr. Briggs. With him chloroform had not been a success, and he generally administered prussic acid.

Mr. Chambers, referring to the horse described by Mr. Cooke, asked whether it was possible to get the bones.

Mr. Cooke said it was not, as the animal was slaughtered.

The President, in closing the discussion, remarked that they must congratulate Mr. Cooke upon bringing forward the cases that he had. At the same time he could not quite agree with Mr. Cooke on one point, and that was about not being able to reach the ground for food. He had recently a case where the animal grazed right up to its death.

The Treatment of Chest Affections.

By Mr. S. Wharam.

There are so many diseases in the treatment of which it is the usual course to apply counter-irritants, that it would be impossible for me in a short communication to give more than an outline of the varied uses and abuses of those very common applications. Therefore I intend to confine myself to counter-irritation in affections of the chest, and my reason for so doing is because I believe the most diverse opinions exist, not simply as to whether certain applications are more or less beneficial than others but that they positively do harm. Professor Williams, in his book, "The Principles and Practice of Veterinary Medicine" says (page 613 on pneumonia)—"The application of the so-called counter-irritants is not only useless but dangerous in the earlier stages, and uncalled for when convalescence is progressing favourably. On page 621 Professor Williams says referring to pleurisy. "The so-called counter-irritants, with rare exceptions, are injurious, and cantharides, turpentine and mustard are condemned." I agree with the Professor that when convalescence is progressing favourably there is no necessity for a counter-irritant, but I consider the statement to be too sweeping, and apt to deter us from applying counter irritants to the advantage of both ourselves and patients. Prof. Williams also states that his views are endorsed by physicians, and quoted, Dr. Wilson Fox and others.

As I was constantly hearing so many different opinions as to the value of applications to the chest, and not willing to accept the views said to be held by the majority of physicians, in human medicines, I conducted experiments on my own account, which have been carried out for 12 months—Jan. 1st, '95 to Dec. 31st—on three studs of horses, the total number being 612. In every case of chest affection during that period, the majority of which were congestion of the lungs or pleurisy, each side received a moderate application of mustard, not exceeding 12 in. sq. in the first instance, and if in six hours time no improvement was manifest blankets were applied after having been wrung out of hot water, with felt pack outside. Out of 70 applications of mustard it was only

found necessary to use the blankets nine times, and of these nine only one horse died. Mustard was chosen for its general convenience, being readily prepared by mixing with cold water into a paste, quickly applied, two minutes rubbing being sufficient, with brown paper placed over before the rug was put on, easily removed if necessary, not causing prolonged irritation and uniform in its action, fluids being apt to blister severely at the most depending parts.

An indiscriminate use of anything is always to be condemned, but if counter-irritation is applied as described, the patient being well clothed and allowed plenty of air, very little inconvenience and no distress is caused by its use. I have frequently seen mustard and other irritants applied all over the ribs at each side, the throat and down the neck to the breast, the latter especially causing much pain, profuse perspiration, and unquestionably doing much harm. The method I first described has worked so satisfactorily, as compared with previous experience, that it will now be adhered to for the future by me These remarks are made not with the idea of laying down any hard and fast rule, for every case requires separate consideration ; but to show that a moderate use of what is so often condemned is often beneficial. After perusing the most recent medical works I find that in the treatment of congestion of the lungs, pneumonia, pleurisy, etc. counter-irritants are recommended, and the following remarks by Dr. Thorogood is evidently a step in the right direction.

"Although some therapeutists have of late been disposed to question the value of counter-irritants, on the theoretical ground of inability to explain their mode of action, yet there is not wanting evidence, both from clinical observation and physiological experiment that irritation in one part of the body may affect the functions and nutritition of other parts. That the stimulation of the surface can influence decidedly the circulation of deeper parts has been demonstrated by Dr. Brown Sequard, for he found that irritation of the skin of the back over the kidneys caused a contraction of the arteries supplying those organs. From this experiment we can understand how a blister may relieve a sudden congestion in the lungs or brain, and how it may act in restoring tone to dilated and paralysed capillaries."

Mr. Chambers agreed with Mr. Wharam in a moderate use of counter-irritants.

Mr. Atcherley also expressed the opinion that if they did not sometimes follow the treatment described a good many animals would die.

Mr. Briggs said he must congratulate Mr. Wharam upon his paper. Anyone who had charge of an omnibus stable, where horses were worked hard, knew that if they did not use mustard and other applications they would lose their animals.

Mr. Lane said that as a junior member of the pro-

fession he must say that he did not agree with the application of these counter-irritants, especially the use of mustard. During the last three or four years he had done work in London and Leeds, and had not followed the treatment described. Personally, he thought that if they used anything at all it should be something of a soothing nature. He thought that the removal of a horse perhaps from a crowded stable into a loose box where it got plenty of fresh air was more beneficial than the use of counter-irritants.

Mr. Whitehead said he was a believer in counter-irritation. He had a few railway horses under control and his cases did well with the treatment in question.

Mr. Cooke believed that mustard was a painful application.

Mr. Clough said he had followed the mode of treatment on lines similar to those described by Mr. Wharam.

Mr. Somers remarked that, as Mr. Wharam had pointed out, every case required separate consideration. There was no doubt that in some chest affections stimulants causing the circulation to increase was a very good method to adopt, and particularly in immediate cases of congestion.

The President said that on this subject he found himself in the minority. He did not believe in mustard.

Mr. Wharam said that for the discussion it appeared that the majority agreed with him that the application of mustard was beneficial. He did not advocate, as many people did, blistering a horse all over ; that was distinctly detrimental. It would be impossible for him to get the same results without mustard. If the application was done in good time they could obtain good results. Mustard was easily applied and they could leave the application in the hands of foremen.

Mr. Scriven said that both he and his partner (the President) were rather antagonistic towards the application of mustard. Occasionally he applied mustard himself but he did not leave it with the foreman.

Mr. Wharam wished to explaim that he instructed the men as to when and how to apply the mustard. He added that out of a stud of 200 horses last year they only lost one animal, and that dropped dead in the street from heart disease.

Mr. Lane : There is more in fresh air than in giving a poor brute a little more pain.

Rupture of Stomach.

Mr. Chambers brought forward a case of rupture of the stomach following castration.

After listening to the paper the President and other members said the rupture could not have arisen from the act of castration.

Mr. Chambers said the information he could get was very little. He did not, however, think there had been

any previous disease; he thought that the animal must have overeaten himself.

Uncommon Accident to a Foal's Foot.

By Mr. J. E. Scriven.

The subject of communication is a carting foal, about a fortnight old, the property of Mr. D. Stocker, Towton. It was running in a pasture with its mother, under careful observation and management. On May 10th it was found standing, holding the near foreleg clear of the ground and quite afraid to move. It was with great difficulty travelled home, a distance of a few hundred yards, put into a box, and our services called to it.

On examining the injured member I found the entire hoof-wall and sole had been torn off. How this accident occurred is purely a matter of conjecture, the severed hoof being found in the middle of the field some distance from where the foal was first noticed. I am strongly of opinion that it must have been caused by the mare treading it off, as I can find no other solution of the difficulty. The piece of surrounding ground is almost perfectly level, quite free from rabbit holes, wire fencing, or any thing where the animal might have been fast. You will notice how cleanly the hoof had been torn off, the horny laminæ scarcely being broken. The toe of the os pedis, about 1-inch deep, and 1¼-inch across, of a semi-lunar shape and entirely devoid of covering, was protruding injuriously. The foal had evidently been walking on it on its way home, part of which was on the turnpike the bone was blackened and apparently necrosis was almost certain to supervene.

My client thought it would be best to destroy it, but I advised a trial. The coagulated blood adherent to the sensitive laminæ I allowed to remain, I then bound up the whole foot in cotton and boracic acid ointment, using the ointment very freely as I intended it to remain at least two days before removal. On the second day I removed the dressing and was agreeably surprised to find no hæmorrhage, and the pedal bone gradually disappearing. A quantity of a watery discharge was present and continued for a week, but there was never any fœtor. In the meantime I had a leather boot made like a socket, reaching up to the fetlock, just large enough to hold the foot and dressings. It was now dressed daily, freely using the same dressing as before.

In a week's time the new horn had grown fully ½-inch from the coronary band, and in double that time 1½-inch, the sole and frog growing more rapidly and growing from heel to toe.

By the end of June the wall and sole almost met at the toe, and no doubt would have done but for a small ridge of the pedal bone preventing. Now at this time the foal could walk about, and had an almost perfect foot again. Discontinued dressing. During the

course of the case the opposite leg showed signs of breaking down, but now since using the lame one it is rapidly regaining its natural position. The animal can now trot on the hard road and shews only the slightest lameness, the only thing noticeable being a tendency to club-footedness, which I expect the animal to grow out of in time.

Mr. Mason said he was afraid that the foot would never form like the other one.

The President said the case brought out two points. One was the usefulness of boracic acid. It was a drug which seemed to be greatly scoffed at, but this case at any rate went to show its value. The second point was always to think twice before destroying very young animals.

Mr. Briggs: That is to say, give a chance to the best doctor—Nature.

Influenza Amongst Horses.

Mr. Briggs said that Mr. Wharam had covered much of the ground that he had intended to take. One of his strong points was the usefulness of mustard in cases of influenza, such as they had had since Xmas. He had also intended to remark upon certain cases where death had supervened after an animal had gone to work—that was when the animal had been put to work too soon. His experience was that that was a serious mistake to make. He found that pleurisy was the worst complication in all these forms of influenza. As a sequel of this complaint he had had two or three cases of purpura hœmorrhagica which had yielded to treatment, though very slowly. He had something like 14 or 15 horses suffering from it. It was no doubt infectious; it had been three months going through some stables, but in no case had it taken a horse twice. He wished to recommend the treatment that Mr. Wharam had advocated. He was a strong believer in mustard, which was handy, but he always mixed it with aired water.

Mr. Mason said he was one of those individuals who did not apply mustard.

Mr. Whitehead afterwards mentioned a case of emphysema in cows.

The President proposed a vote of thanks to the members who had introduced subjects to the meeting, and this was seconded by Mr. Somers and cordially agreed to.

A hearty vote of thanks was also accorded to the President, the speakers to the resolution dwelling upon the success that had attended Mr. Clarkson's idea of having several short papers for discussion, instead of only one.

The President, in reply, said his idea was that in having a series of papers and addresses they would have greater variety and more interest in the discussions.

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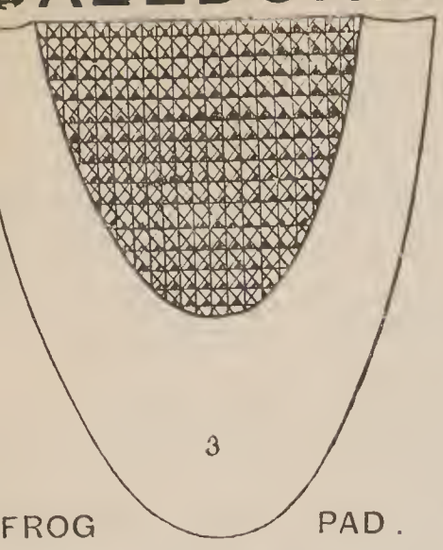

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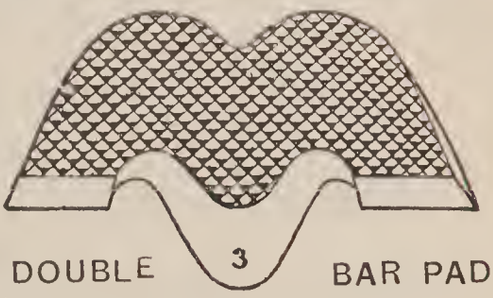

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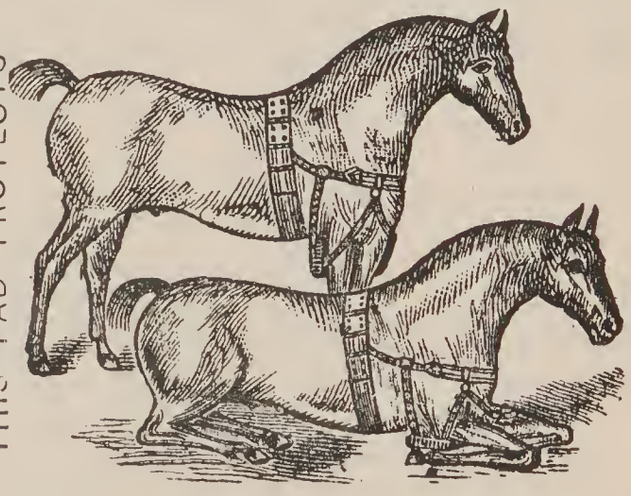

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SESSION 1896-97.

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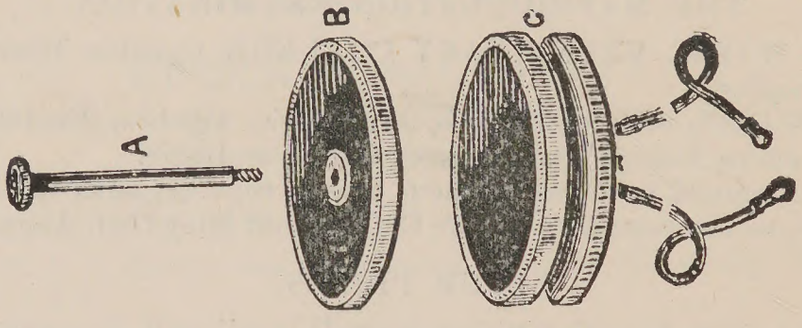

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